AN INDUSTRIAL PUBLISHING CORPORATION MAGAZINE

PMM

Precision Metal Molding

INCLUDING DIE CASTINGS MAGAZINE

MARCH
1957

devoted exclusively to:

DIE CASTINGS

INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

SHELL MOLD CASTINGS

"Use of a resin bonded shell core eliminated machining on the 1/16" thick web."

G. B. Keith
Mechanical Engineer
Tennessee-Eastman Corp.

See Page 3

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CERTIFIED uniform high-quality ingot can help you make better castings at high production speeds.

- All ingot is production controlled under the most modern methods to insure purity.
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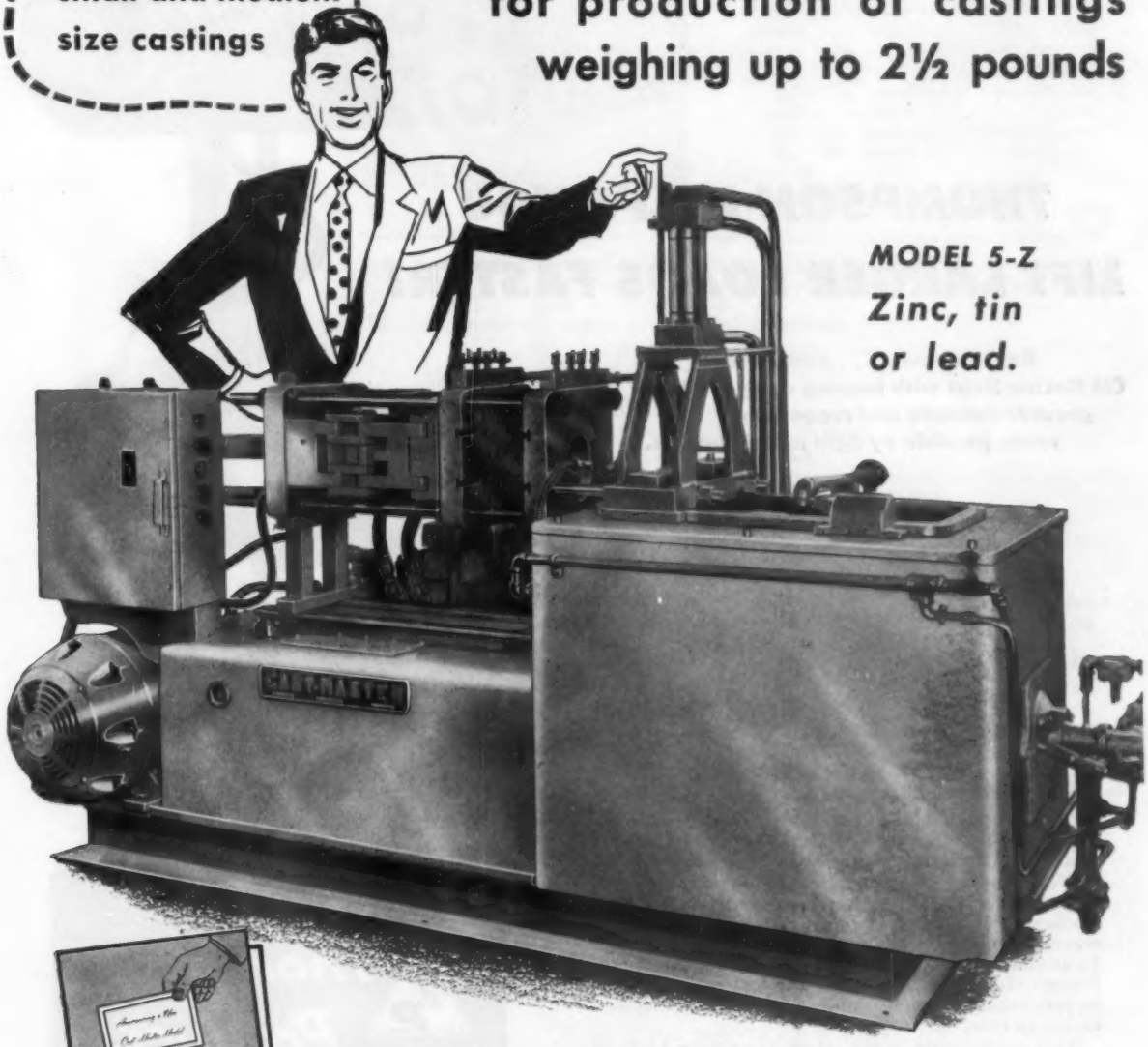

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March 1957:
Volume 15 Number 3

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BETWEEN THE LINES

the editor's viewpoint on articles in current and forthcoming issues

FOR THE SIXTH YEAR, PMM offers you the annual Powder Metallurgy Directory as the central feature of its April issue. Watch for it next month, and plan to hang onto your copy for year-'round reference. It will have all its regular features . . . where to buy, technical and design data, plus a special presentation on the factors that must be considered when you redesign components for powder metallurgy.

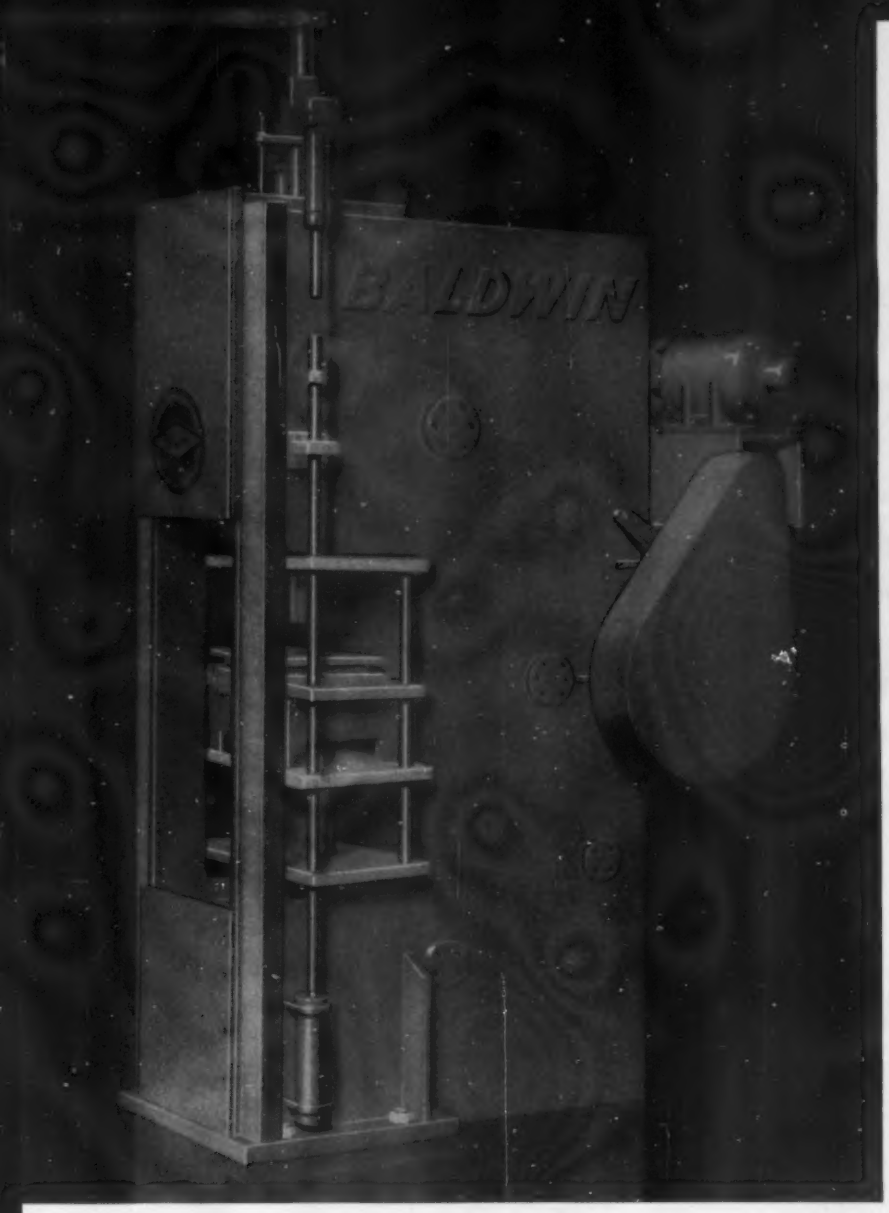
A COUPLE OF NEW ALLOYS you should know about are introduced in this issue of PMM. One of them, a high-strength aluminum alloy, is specifically designed for permanent mold and sand casting and appears headed for important use by the aircraft industry. The other is a new stainless steel that can be investment cast. Properties, casting characteristics, and many of the features of these alloys are presented on pages 48 and 63.

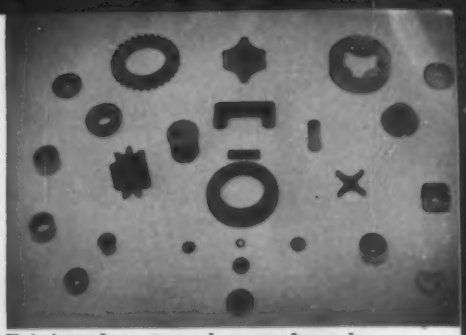
DIFFERENCES IN DIE DESIGN, as practiced in Great Britain and the United States, have led to an interesting article in this issue of PMM. Several months ago, we ran a series of articles on the design of die casting dies for temperature control. W. M. Halliday, a well-known British designer, wrote it for us. Then an American die designer pointed out to us some ways that die practice in this country differs from that in England, especially with regard to sprue bushings and sprue spreaders. Two points of view are better than one, so we asked him to tell our readers about it. The article by Folke Halward appears in this issue, and if interest in the first series is any criterion, there'll be lots of requests for extra copies and tear sheets of the current article. It starts on page 49.

MORE DESIGN POINTERS on investment casting appear in this issue. The first of these pointers appeared in February and brought many requests for extra copies. You'll find them starting on page 40.

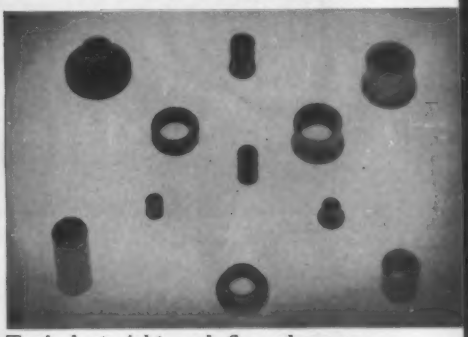
COST STUDY TEAMS are being set up by progressive manufacturers who are meeting tighter market conditions and more competitive selling by examining their internal operations more closely. How one business machine manufacturer subjected his product to close scrutiny to see where money could be saved is described in this issue. Powdered metal parts have now replaced many parts formerly produced by machine shop methods. Facts and figures are given, starting on page 59.

THERE'S AN ABRASIVE BELT MACHINE to do almost any specific job you require. We were frankly impressed with the range and diversity of equipment displayed at a recent show of abrasive belt machines, many of them well-suited for grinding, polishing and sanding castings. We have collected a report on them for you, beginning on page 68.





Fabricated parts and gears formed on Baldwin Compacting Presses.



Typical straight and flanged powdered metal bushings made on Baldwin Compacting Presses.

Other parts being made at United States Graphite on Baldwin presses. The double hub and counterbored parts are test pieces. Others are production items.

New, low-cost compacting presses for powdered metals and ceramics

Baldwin-Lima-Hamilton Corporation announces that its 100 years' experience and know-how in building hydraulic presses has been incorporated in a new, low-cost compacting press—the 30W—specifically designed to serve the powdered metal and ceramics industry.

Its 1-piece frame and floating die deliver the same uniform pressure, the same rigid 4-point guiding, as our regular heavy duty 4-column hydraulic presses. The 30W is designed for versatility—extra motions may be added as requirements become more complex without the need for additional machining.

Rated pressure of the Baldwin Model 30W is 30 tons, with a 20-ton ejection capacity. Stroke is adjustable through its entire fill range of 0 to 4½ in. For complete details, including specifications, write to the Hamilton Division, B-L-H Corporation, Hamilton, Ohio.

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Shown above are representative sleeves which we produce

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ACTUALLY CLAMPS 400 TONS!

*Strain gage rated by independent consulting engineer

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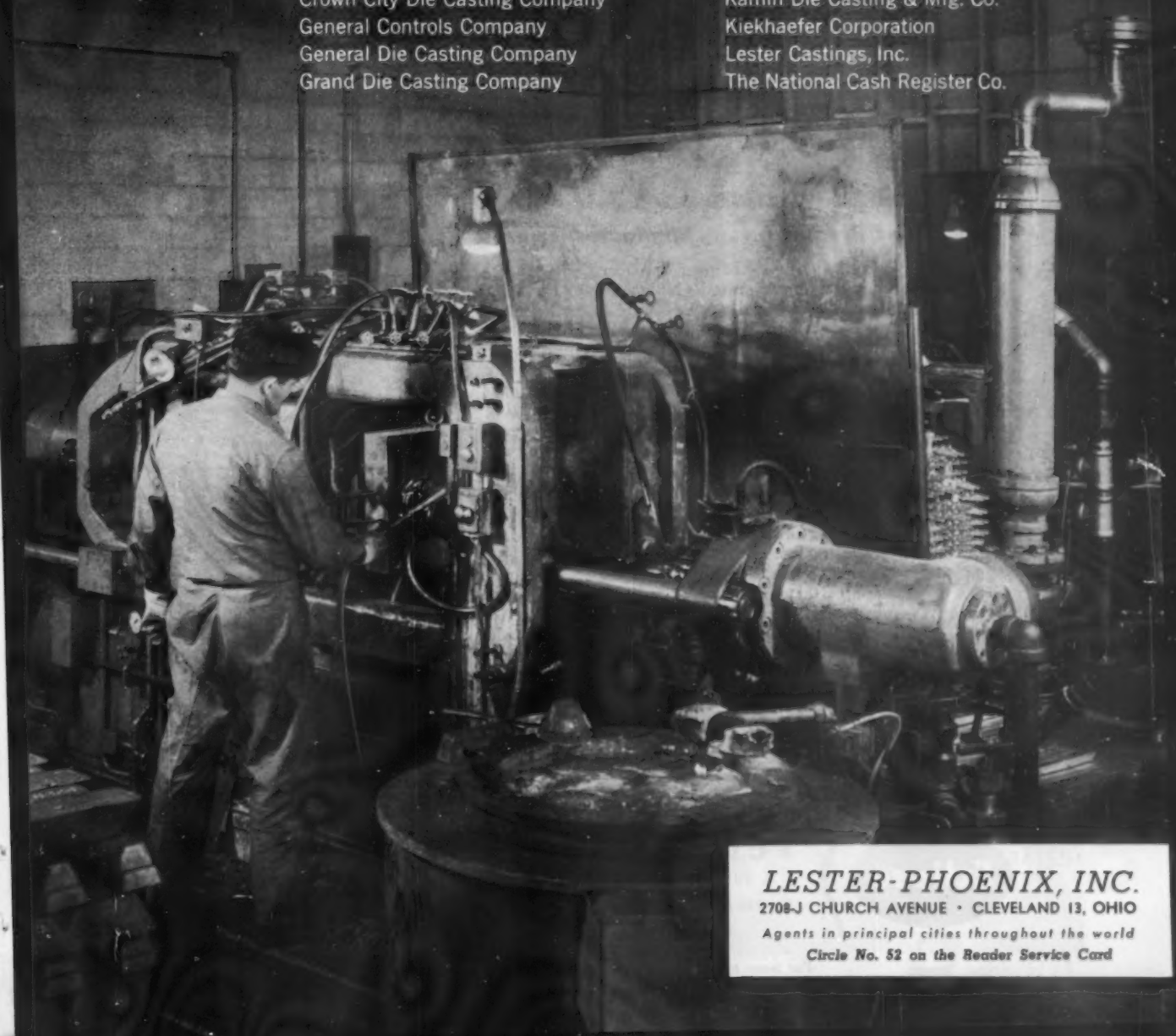
Johnson Motors Division
Kamin Die Casting & Mfg. Co.
Kiekhaefer Corporation
Lester Castings, Inc.
The National Cash Register Co.



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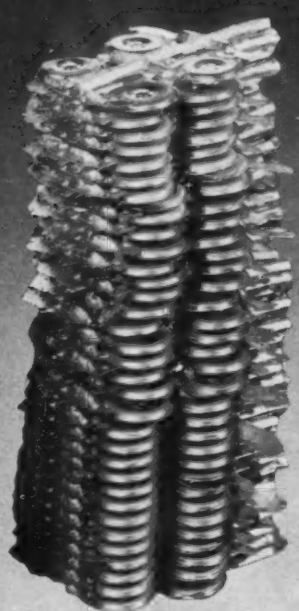
Increases Production . . . Eliminates Rejects

● The new Eclipse double-chamber dry-hearth-type metal melter—actually a new method—replaced two crucibles and one reverberatory furnace at Le Claire Manufacturing Co., Le Claire, Iowa, and has paid for itself at the rate of $450 a month in savings! The new melter combines advantages of Eclipse direct firing with the first truly separate melting and holding chambers. At Le Claire, the one dry-hearth melter has made this remarkable record supplying all metal for the plant's sand- and die-cast aluminum casting operations. Castings for power mowers, electric and gas motors, as well as many others, are cast from this one furnace. Actually designed for high-production operation, the melter gives even better results in larger foundries.

Pigs are melted on a steep sloping hearth which gives fast run-off of molten metal to the holding chamber. Gassing and agitation of the metal in holding chamber are eliminated because no cold metal enters the bath. Direct firing permits faster, more efficient heating, requires less fuel. All moisture is driven off while metal is melting . . . all oxide inclusions are deposited on surface of hearth where they are easily removed by raking. Hearth and holding chamber are separately heated and controlled for ideal melting and pouring temperatures. And there are more additional quality-improving and cost-saving advantages for your *large or small* operation than can even be suggested here! Write *today* for . . .



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ALMAG 35

for highest purity available in aluminum alloys... As with any product of highest quality reputation, attempts are constantly made to equal the outstanding characteristics of Almag 35. Almag 35 cannot be duplicated by others because it is fully protected by patents.* Claims for equal or similar properties are false.

We do not take our patent responsibility lightly. No other aluminum alloy has ever been subjected to such rigid research and testing as Almag 35. Our purposes are to improve and refine, if possible, the outstanding properties Almag 35 has for high strength, ductility, dimensional stability, high shock and corrosion resistance.

Very shortly we hope to present to the trade another series of improvements in light metal alloy properties which may well change the standards for these metals in all classifications.

*U.S. Patents Nos. 2564044, 2583473, 2628899, 2733991 and 2764482.

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"Darkroom test* proves raw camera castings

High precision of Doehler-Jarvis make new cameras light-tight

Revere-made Wollensak "43" 8 M/M spool-type turret camera. Built-in filters provide finger-tip adjustment for three conditions: (1) clear shooting (2) haze (3) outdoor shots with indoor film.

Lights! Camera! Action . . .

Our hero (in darkroom above) has just snapped together the three die castings that house the new Revere-made home movie camera shown left . . . snapped them together around a tell-tale light.

The castings are raw . . . just as they come from Doehler-Jarvis. Notice no light escapes where the housing parts join. *Even before machining, the seal is light-tight.*

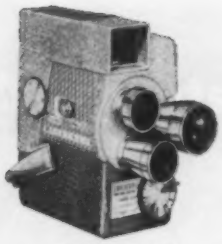
That's precision for you. The kind Revere Camera Company expects and gets from Doehler-Jarvis.

What's more, each casting provides, "no-tolerance" machining base points. From these points Revere establishes all basic dimensions for machining of the camera mechanism. They get an accuracy so high they can afford to offer a lifetime guarantee on the action.

Realizes many design advantages

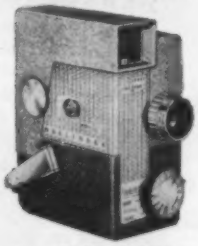
Revere designs from the start to take full advantage of die casting. In most models, for example, Doehler-Jarvis is called in while units are still in the hand sketch stage.

In this instance, details worked out include the use of lightweight magnesium; ways to reduce wall thicknesses (they're way thinner than ADCI minimums); location

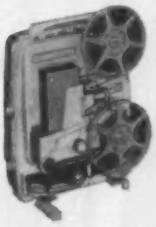


Wollensak "43"
8 MM Spool-type Turret Camera

Wollensak "815"
Automatic Slide Projector, 2x2

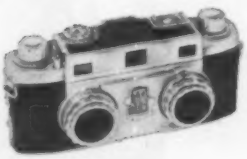


Wollensak "42"
8 MM Spool-type Cine Camera



Wollensak "715" 8 MM
Movie Push-button Projector

Wollensak "23"
8 MM Magazine Turret Camera



Wollensak "10"
Stereo Camera

***Darkroom test illustrates precision** of the raw Doehler-Jarvis die castings as received for use in the above Revere-made Wollensak cameras and equipment. Revere subjects the finished cameras to a much more severe 4-hour direct sunlight test. You can be sure they're light-tight.

fit so closely light doesn't pass..."

die castings helps Revere even before machining

of bosses, lugs, corner reliefs; extra back-up for stressed sections; tool-ups for machining and finishing; interchangeability between this and other models. All this pushes ultimate costs down, quality up.

Net result is an outstanding camera that is proving itself on the sales counter.

Doehler-Jarvis die-casts parts for all Revere-made cameras and projectors, not only their name line, but also Wollensak and other brands. Asked why they prefer die castings made by Doehler-Jarvis, Revere put it very simply: "rejects almost zero" . . . "likewise salvage" . . . "D and J people live with our jobs".

Right now Doehler-Jarvis people are "living with" the jobs of some 1400 major users of die castings. They'll do the same for you.

Doehler-Jarvis
DIVISION OF NATIONAL LEAD COMPANY
General Offices: Toledo 1, Ohio

In Canada:
Barber Die Casting Co. Limited
Hamilton, Ontario

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CASTING ABOUT

technical news of applications & processes involving precision metal moldings

SEVEN STRAIGHT YEARS of daily battling dust and grime that only a gravel conveyor can produce . . . and yet, the powdered bronze sleeve bearings in the system still function perfectly. That's the experience of a large Canadian producer of concrete blocks. The story started some seven years ago when J. Cooke (Concrete Blocks) Ltd., of Aldershot, Ontario, installed 20 huge outdoor conveyors and equipped them with Oilite bearings made by the Amplex Division of Chrysler Corp.

Despite the dirt and grime that circulated around these bearings, which operate daily in all kinds of weather, not a single one of these bearings has had to be replaced and are reported, by the Cooke engineers, to be working as well as they did originally. No seals are used on the bearings, which are completely exposed to the elements, and no additional lubrication is possible on the two center rollers.

BETWEEN 7 AND 9 PERCENT MORE cemented carbides will be used by American industry in 1957, according to K. R. Beardslee, general manager of General Electric's Metallurgical Products Department. Expected step-up in defense spending and increased plant expansions will account for the rapid expansion, which has been developing steadily since 1950.

NEW DETECTIVE to find hidden facts about metals is an X-Ray microscope made by General Electric. The new microscope, whose secret lies in the extremely tiny size of the focal spot (only 40-millionths in diameter), promises to reveal such conditions as corrosion in metals, effect of foreign materials in metals, soundness of electroplated coatings and the effects of various processes on the behavior and structure of metals. Magnifications up to 1,500 times are achieved, while disclosing the inner structure of the object being examined.

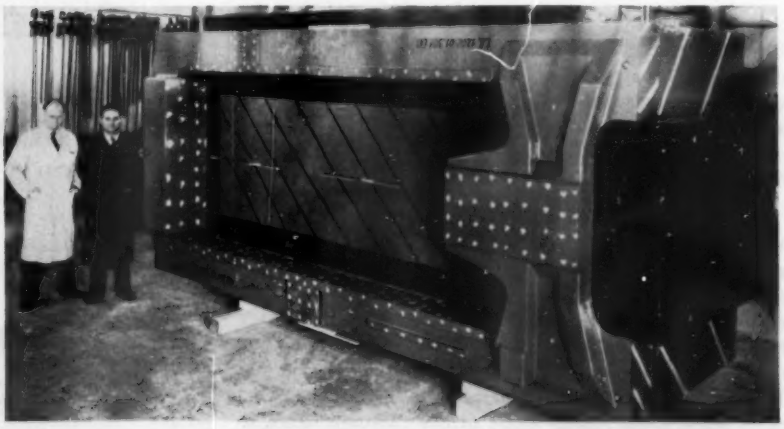
THE GIANT PATTERN shown here is the first step in a program which will end with delivery of a 1200 ton aluminum die casting machine to a customer in the summer of 1957. This mammoth frame is being cast and finished in Germany for Lester-Phoenix, Inc., by Maschinefabrik Weingarten A/G, who are licensed to build and sell Lester equipment in Europe. The balance of the components are being fabricated and assembled in Lester's Cleveland plant, and final erection will be made in the customer's plant. In the photo, Alfred Wutherich and Joseph Hummel, Weingarten engineers, are shown standing beside the pattern for the machine's frame.

The frame will measure about 15′ long, 6½′ high and 6′ wide and will weigh about 65,000 lbs.

Continued on page 14

VITAL STATISTICS ›

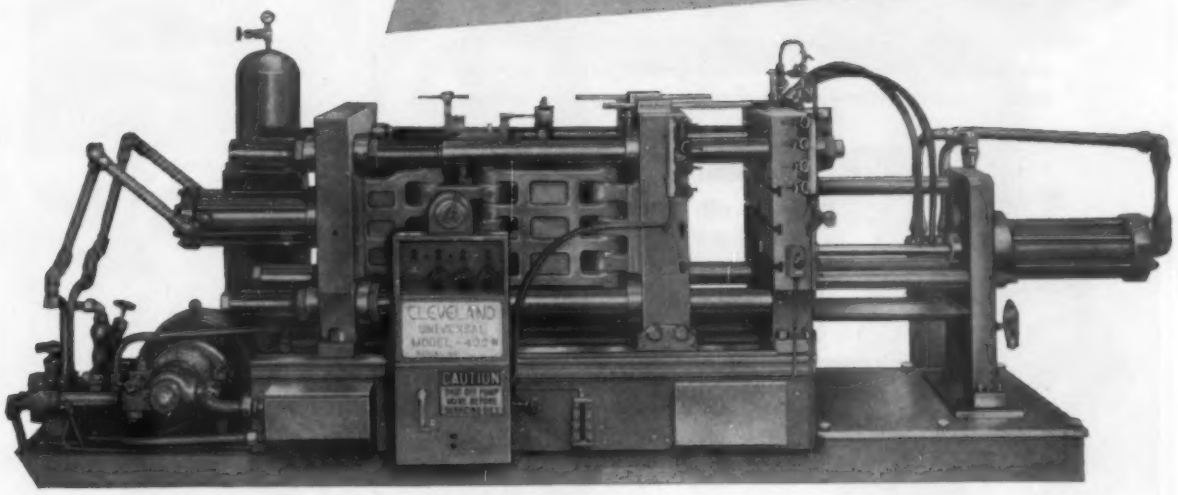
Locking pressure (by strain gage)	1200 tons
Maximum shot capacity, incl. biscuit and runner (@ 10,100 p.s.i.)	40 lbs.
Plunger stroke	25 ins.
Unobstructed platen area	72″ H x 55″ V
Die opening	36″ to 10¼″
Maximum die height	50 ins.
Total weight (approx.)	170,000 lbs.



Meets *ALL* your requirements

for *PROFITABLE* die casting!

Cleveland Model 400-N
shown with cold chamber end.



The CLEVELAND model 400-N
Hydraulic Universal Die Casting Machine

Here are the features of the Cleveland Model 400-N that will give you better castings, faster, at less cost:

- Massive, rigid construction throughout for dependable, economical performance.
- Powerful die locking pressure — 400 tons, strain gauge tested.
- Rapid, smooth die closing and opening for high production operation.
- High metal injection speeds to produce sound, dense, hardware finish castings.
- Safe, simple control—manual or automatic.
- Ample room for die mounting, for operation and maintenance.
- Universal construction — easily convertible for either hot or cold chamber operation.

To get the most from your die casting department —in speed of production and quality of castings —investigate the many advantages of the Model 400-N Cleveland. Let the Cleveland sales engineer in your area show you how the Model 400-N can improve your die casting production with money saved . . . or write direct for full details.

REMEMBER, CLEVELANDS CUT COSTS

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4952 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
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Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

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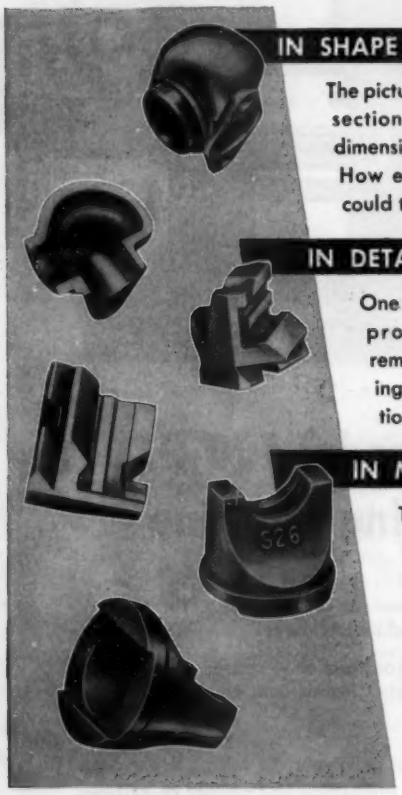
HERE'S HOW...

INVESTMENT CASTING ANSWERS DESIGN PROBLEMS

Investment Casting is a specific production method that fills a specific function. This process offers much greater latitude in shape, detail reproduction and choice of alloy than any other process.



IN SHAPE

The picture tells the story . . . from the cross section it can be seen that the inside dimensions are greater than the holes. How else but by Investment Casting could this be made in one piece?

IN DETAIL REPRODUCTION

One look quickly shows the machining problems — most of them stock removal. By using an Investment Casting 21 out of 45 machining operations were eliminated.

IN MATERIAL

These nozzles for a highway striping paint sprayer, were produced from cold rolled steel until ground glass was introduced into the paint for its reflective properties. To provide necessary wear resistance these parts are now cast in a non-machinable alloy. Performance was not sacrificed because of material limitations.

These are a few examples demonstrating that the function of the part is the first consideration in design — and — the Investment Casting process was the economical answer.

For more information ask for our brochure . . . its FREE of course.

HITCHINER
Manufacturing Company
MILFORD 7, NEW HAMPSHIRE
REPRESENTATIVES IN PRINCIPAL CITIES

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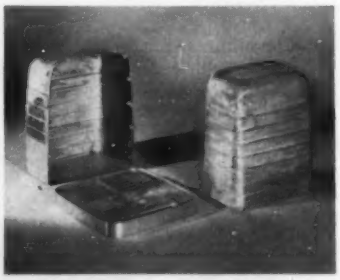
CASTING ABOUT

continued from page 12

AN OPEN AND SHUT CASE for a movie projector is the neatly designed enclosure for the Bell & Howell 8 mm Monterey "253"



which is built of three close-fitting aluminum die castings. Except for a few perfunctory tapping operations (most fastenings are with thread-cutting screws) and the spraying of metallic baked enamels in two colors, there is no work to be done on the castings as received from the job shop die caster who produces them. Paul J. Richartz, chief engineer at Bell & Howell, says "No other method of fabrication provides the beauty, durability and quality which we consider a 'must' for precision photographic equipment". Shown here are the three die castings as received, and the completed assembly which, with the projector mechanism, weighs a total of only 13½ pounds.

WHO MAKES THE MOST metalworking equipment? Manufacturers in Michigan. So says Denham & Co., Detroit industrial merchandisers, who offer U. S. Government statistics to prove that Michigan is now the nation's largest producer of metalworking equipment.

Continued on page 18

Diluting COMPLEX CASTING PROBLEMS WITH SEASONED MECHANICAL INGENUITY at MADISON-KIPP--for zinc and aluminum castings

One complex die casting often highlights the industry's potential for other uses. This may be the case with the Ohio Chemical Inhaler Casting here illustrated.

For full process utilization seasoned mechanical ingenuity is required, from die designing through tool making and on to the final dependable production.

The skilled mechanics at Madison-Kipp have been helpful to highly placed designers and engineers for over a quarter century. They may be able to assist you.

Please clip this ad as a reminder to contact us when you have die casting requirements.

kipp

MADISON-KIPP CORPORATION

213 WAUBESA STREET • MADISON 10, WISCONSIN, U.S.A.

Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

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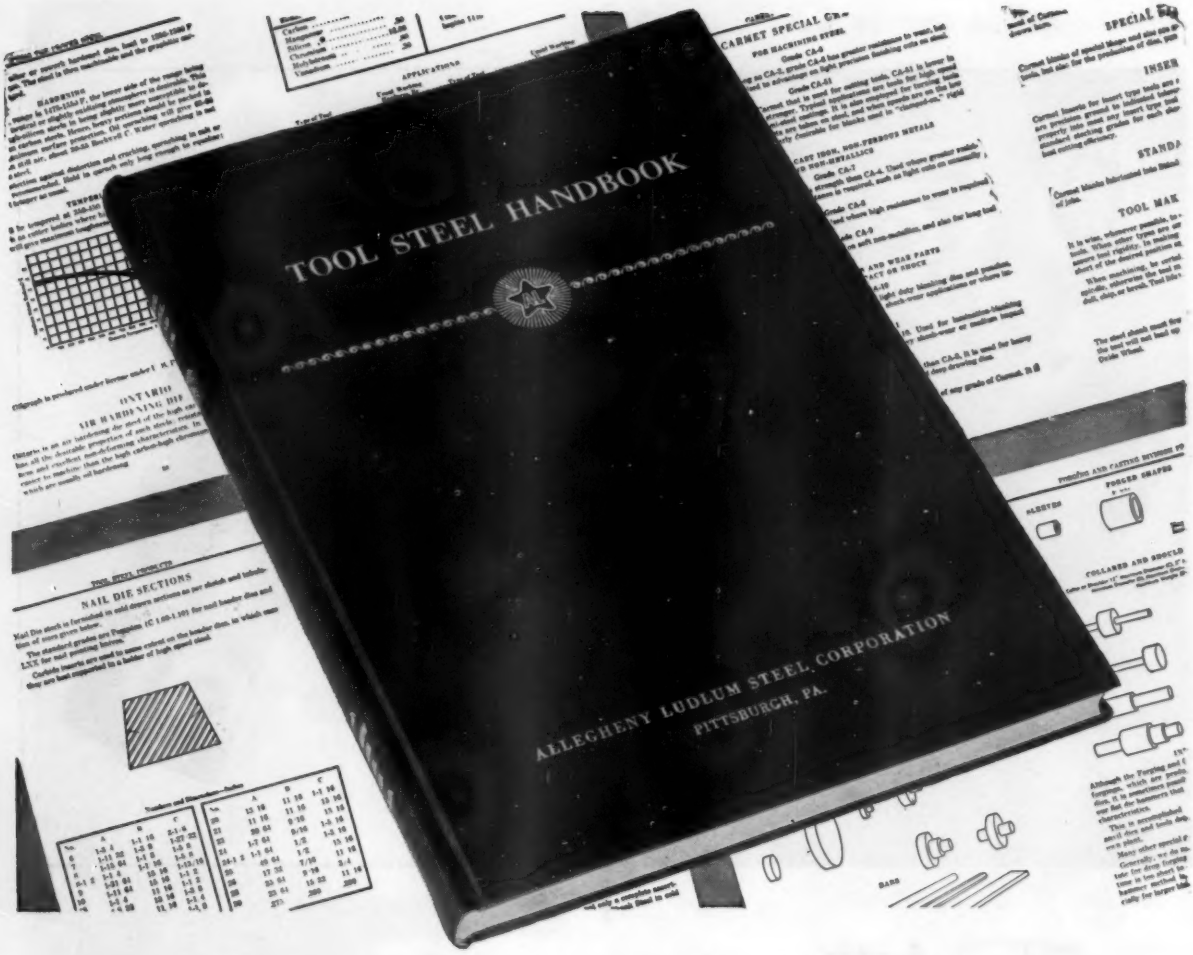

AVAILABLE NOW—196 pages of Valuable Tool Steel Information

Another printing of our Tool Steel Handbook—one of the most comprehensive treatises of its kind ever offered by a tool steel producer—is just off the presses. In addition to a relatively complete picture of Allegheny Ludlum Tool Steels, their properties, applications and the forms in which they are available, this 196-page case-bound book presents an extensive discussion of heat treating and handling techniques as well as a complete set of weight tables and other useful reference material.

Your copy of the Tool Steel Handbook will be sent—*without charge*—upon request. Our only stipulation: please make your request upon your company letterhead. ● Write to *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pennsylvania.*

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For complete MODERN Tooling, call

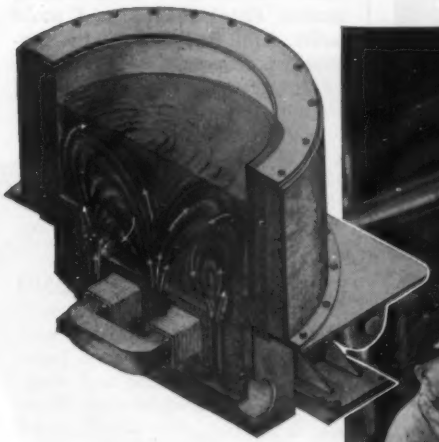
Allegheny Ludlum

AL — FINE TOOL STEELS SINCE 1854

For more information circle No. 5 on the Reader Service Card

HARD-TO-MELT BRONZES SUCCESSFULLY HANDLED
in
AJAX INDUCTION FURNACES

Brass and bronze foundries all over the country have found AJAX-TAMA-WYATT induction furnaces a reliable tool for melting silicon bronzes, aluminum bronzes, leaded bronzes, phosphor bronzes, and other high strength alloys. Operation is highly economical due to the good uniformity of the alloys, low ratio of rejects, drastic reduction of metal losses, and clean operating conditions. This recent development opens the field for the use of AJAX induction furnaces in all foundries where difficult-to-melt alloys are handled.



Cross section of AJAX-TAMA-WYATT twin coil induction furnace such as used at the Torrance Brass Foundry. Heat is produced within the molten metal in the secondary channels and conveyed throughout the melt by electromagnetic circulation, resulting in minimum metal losses and high uniformity of alloy. Temperature is automatically controlled.

Photograph courtesy of Long Beach Press-Telegram, Long Beach, Cal.

The furnace pictured above is melting aluminum bronze at the **Torrance Brass Foundry, Torrance, Cal.,** operating at a temperature of 2400 F, for the production of high strength centrifugal castings. This unit is rated 100 kw. Note also the clean, smokeless operation as shown in the unretouched photograph.

AJAX ENGINEERING CORP., TRENTON 7, N. J.

AJAX TAMA-WYATT = **INDUCTION MELTING FURNACE**

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., The Ajax Hultgren Electric Salt Bath Furnace

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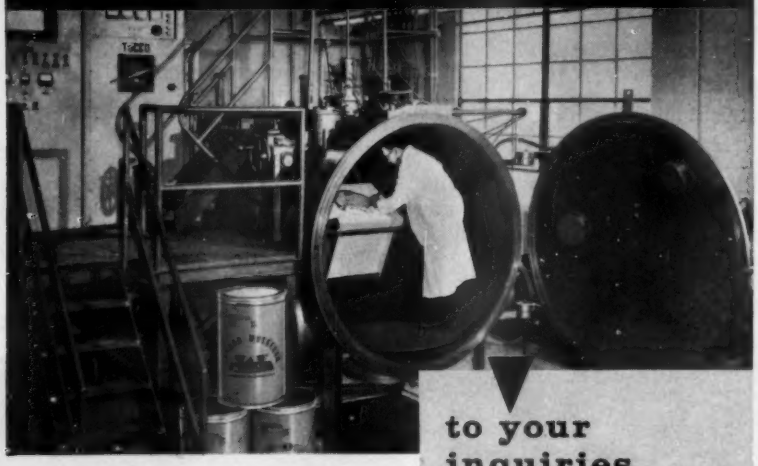
Our facilities are open...



to your inquiries about Cannon-Muskegon

VACUUM-MELTED

UltraMet alloys and service

WHATEVER your metallurgical problem, Cannon-Muskegon is equipped and staffed to solve it. Our metallurgists can make the *right vacuum-melted* alloy to fit your need. We can develop and test it in the ultimate in modern research and testing laboratories . . . then produce it to specifications in our modern plant. What's more, Cannon-Muskegon recommends proper handling methods for best results in your application.

In addition, Cannon-Muskegon offers a wide range of ferrous-, nickel- and cobalt-base alloys for your specific needs. These super-clean alloys are poured at pressures from 1 to 10 microns — available in sample or production quantities . . . in cast billets or ingots. Vacuum-melted alloys offer cleaner, smoother surfaces . . . greater tensile strength, ductility and wear life . . . higher electrical and magnetic properties. For complete vacuum-melting service, see Cannon-Muskegon.

Now available are:

- ***Materials for remelt*** — under conventional air melting, inert gas, vacuum.
- ***Casting development*** — includes research and experimental facilities for investment, shell mold, dry sand, and permanent mold castings.
- ***Ingots or cast billets*** — for rolling, forging or extruding in individual weights up to 250 pounds.

ULTRA MET
VACUUM-MELTED ALLOYS
FOR INDUSTRY

MODERN RESEARCH facilities and experts are at your service. Constant research with known alloys develops our abilities . . . to your advantage. We are now testing alloys containing boron, aluminum and titanium . . . with interesting results. Send us your problems.

For full particulars write for our New Bulletin on Vacuum-Melting and Air-Melting facilities and products.

CANNON-MUSKEGON CORPORATION

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METALLURGICAL SPECIALISTS

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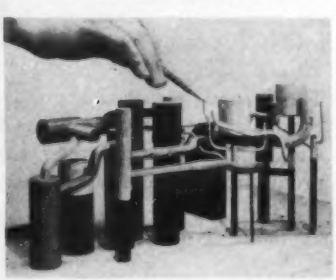
CASTING ABOUT

continued from page 14

VACUUM DEGASSING of aluminum is the subject of a research report released by the Office of Technical Services, U.S. Department of Commerce. Based on data developed at the Naval Research Lab, the 12-page booklet reports on improvement in mechanical properties produced in various aluminum alloy castings following vacuum degassing of the melts. Determination was made for different compositions, section thicknesses and mold melts. The findings: while mechanical properties are improved by the presence of grain refining additions and by rapid solidification such as occurs in thin sections and chill molds, further improvements in tensile strength, yield strengths and elongations are effected by vacuum degassing.

PREFORMED METAL TUBES sheathed in flexible refractory sleeve are used to form small, intricately shaped, unlined passageways in aluminum and magnesium alloy sand castings. Robert F. Dalton, Howard Foundry research and development director, will describe the process at the meetings of the American Foundrymen's Society in May. Both the tube and sleeve are removed after making the casting . . . the tube is dissolved out by a chemical agent and the sleeve is removed manually and serves as visual evidence of a clean passageway. The aluminum and magnesium alloys are said not to be affected by the chemicals used. Medium core diameter is ⅛". Core holes of this diameter can be cast as long as 16".



COMPLEXITY of internally cored passageways in sand cast aluminum aircraft fuel control component is shown by this core mock-up. There are seventeen cores, including seven sheathed-tube cores, which are simulated by wires; sand cores are simulated by wood.

85,000 sq. ft. of progress...

that won't stop!

Austenal's new **microcast** *plant utilizes the ultimate in investment casting technique and equipment.*

Pioneer and leader in investment casting, Austenal, Inc., is building a new 85,000 square foot plant to augment its present Microcast production facilities.

Austenal's new LaPorte, Indiana plant will allow for greater casting versatility, with the precision and superiority inherent in Microcast parts.

New production line vacuum furnaces, designed especially for Austenal, will make possible the melting of high temperature alloys never before castable.

MICROCAST PRECISION CASTINGS PROCESS

austenal

INC.

microcast division

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Other Austenal Microcast research and production facilities located at:

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CHICAGO, ILLINOIS
NEW YORK, NEW YORK

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NEWS OF INDUSTRY & ASSOCIATIONS

activities of people, companies & groups in the precision metal molding industries

TITANIUM PLANT IN FULL PRODUCTION

A GIANT REAMER used to remove the reaction products from the retorts. Sponge titanium mixed with sodium chloride results from the sodium reduction of titanium tetrachloride.

The nation's largest titanium sponge plant has reached capacity production, it is announced by A. L. Foscue, President, Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation. "The plant at Ashtabula, Ohio, with a rated annual capacity of 7,500 tons of titanium sponge has been successfully producing at capacity level during a continuous period of 45 days."

This operation is the first in the United States to produce titanium metal sponge commercially by the sodium-reduction process rather than the magnesium-reduction method. Capacity production was attained less than nine months after the first 'heat' or 'batch' of titanium sponge was produced at Electromet's plant in Ashtabula, April 26, 1956.

"The process, using sodium to reduce titanium tetrachloride, was developed over a six-year period," Mr. Foscue said. "Electromet has conducted research on methods of producing titanium for more than 15 years and for more than 20 years has produced various alloys of that metal."

One of the most-publicized materials of recent years, titanium is being produced at a rapidly increasing rate. Production of titanium sponge in the United States has grown from a mere three tons in 1948 to 7,200 tons in 1955, and an estimated 13,000 tons in the past year. Output is expected to approach 30,000 tons annually by the end of 1957.

The light weight and high strength of titanium and its alloys make it particularly attractive to the aircraft industry, where strength and weight are important factors. The metal is only about half as heavy as steel but its alloys for engineering use approach the tensile strength of most alloy steels.

Titanium is also heat resistant, maintaining its strength at temperatures up to 700 deg. F. Other light-weight metals begin to lose strength rapidly at less than half that temperature.

Corrosion resistance makes titanium of special interest to the chemicals industry. Valves, impellers and heat exchangers have been made of it for applications where highly corrosive conditions are an important factor.

As titanium production grows, greatly expanded civilian use of it is anticipated. Titanium has already been used in commercial airliners for weight reduction, and greater use will probably be made of it in new jet-propelled planes. Its corrosion resistance makes it attractive also to the paper and marine fields, and the petroleum, food and electronics industries are additional potential markets.

Practically all titanium at present is going to military use, particularly in aircraft. Major applications for it in that field include fuselage skins and stiffeners, fire walls, exhaust shrouds and similar parts which are heated by both the engine and air friction. Fasteners, forgings such as engine mounts, spars and other support members, gun blast tubes, dive breaks, landing gear and arresting hooks are also being made of titanium for aircraft.

GOODRIDGE RESIGNS FROM HORIZONS, INC.

Edwin T. Goodridge

Edwin T. Goodridge has resigned as president of Horizons Incorporated, process and material research organization of Cleveland, Ohio and Princeton, New Jersey.

Mr. Goodridge, according to the announcement released today, has made this decision in order to devote his full time to other business activities.

He is being retained by Horizons in a consulting capacity.

Goodridge, along with Dr. Eugene Wainer, co-founded the company in 1946.

During his ten years as president, Horizons has grown to its present status as one of the nation's leading independent research organizations.

BUNKER HILL CO. ANNOUNCES EXPANSION

A $15 million expansion program was announced by The Bunker Hill Co., a 70 year old lead-zinc mining smelting and fabricating company. The expansion program, to cover a five year period, will provide for expansion and modernization of plant equipment and enlargement of by-products recovery facilities.

The future picture for Special High Grade zinc looks exceptionally good owing to the continuing growth of the die casting industry. In the last 15 years, the consumption of Special High Grade zinc in the die casting industry has increased by nearly 200 percent. Much of this growth has been through increased use of zinc die castings by the automobile industry. As an example, the increase from 57 to 62 pounds of zinc die castings on 1956 cars to from 61 to 66 pounds on the 1957 models.

Another product of Latrobe's

Research and Development

The Aristocrat of Die Casting Die Steel

New

pre-hardened

VISCOUNT 44

Die Casting Die Steel

Eliminates heat treat after machining!

Viscount 44, Latrobe's new prehardened die casting die steel, offers tremendous advantages when used for die casting dies. Furnished prehardened, in a range of Rockwell C 42-46, the use of this steel eliminates the need for heat treatment after machining . . . no need to worry about size change or distortion due to heat treatment.

The machinability of Viscount 44 in the prehardened state is made practical through the introduction of fine, evenly dispersed sulphide particles to the steel. Years of experience in the production of DESEGATIZED® steels have made it possible for Latrobe to produce Viscount 44 with its uniform distribution of the free-machining sulphide additives.

Viscount 44 is an air hardening, 5% chromium die steel containing 1% Vanadium. The high Vanadium content increases its resistance to wash and heat checking and imparts superior physical properties at elevated temperatures.

Latrobe

STEEL COMPANY

Main Office and Plant: Latrobe, Pa.

Branch Offices and Warehouses Located in Principal Cities

Mail today for further information and stock sizes

LATROBE STEEL CO.,
Latrobe, Pa.

Please send more data on Viscount 44.

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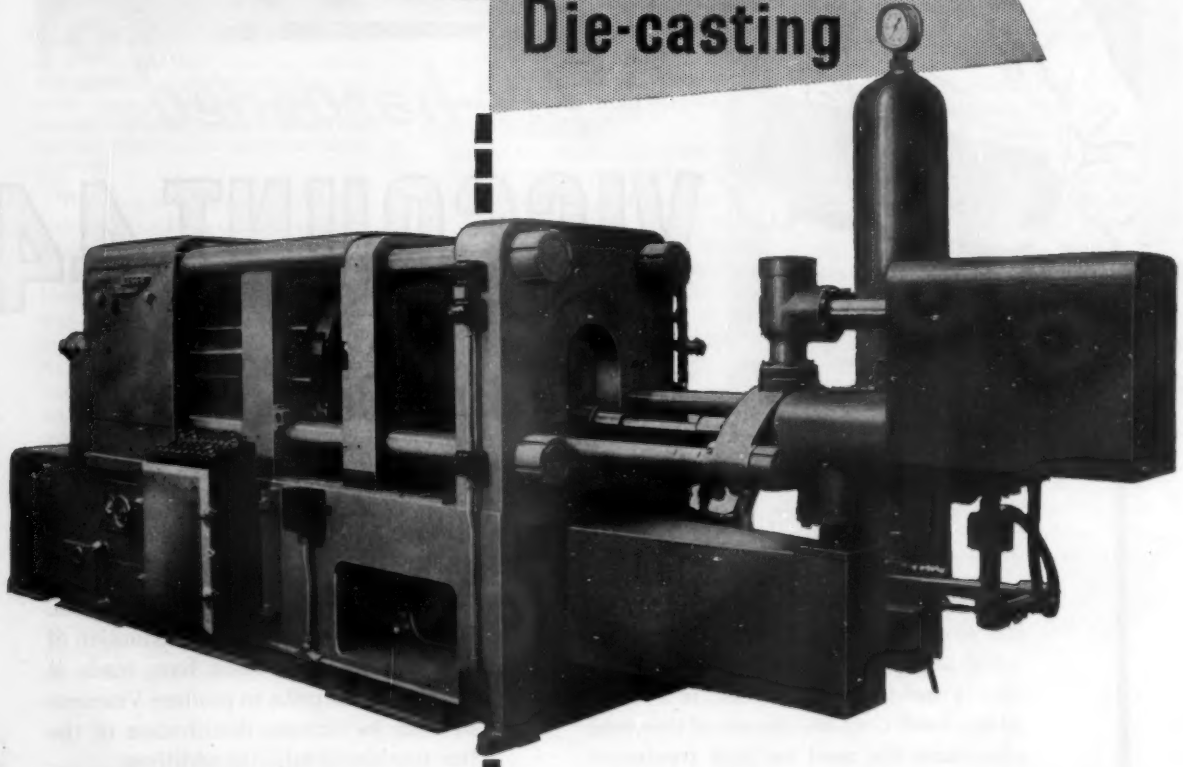
For

Micro-fine

Die-casting



Machines 70-1000 tons

locking force, arranged for Hot or Cold Chamber operation

WORKS:
THE PROJECTILE &
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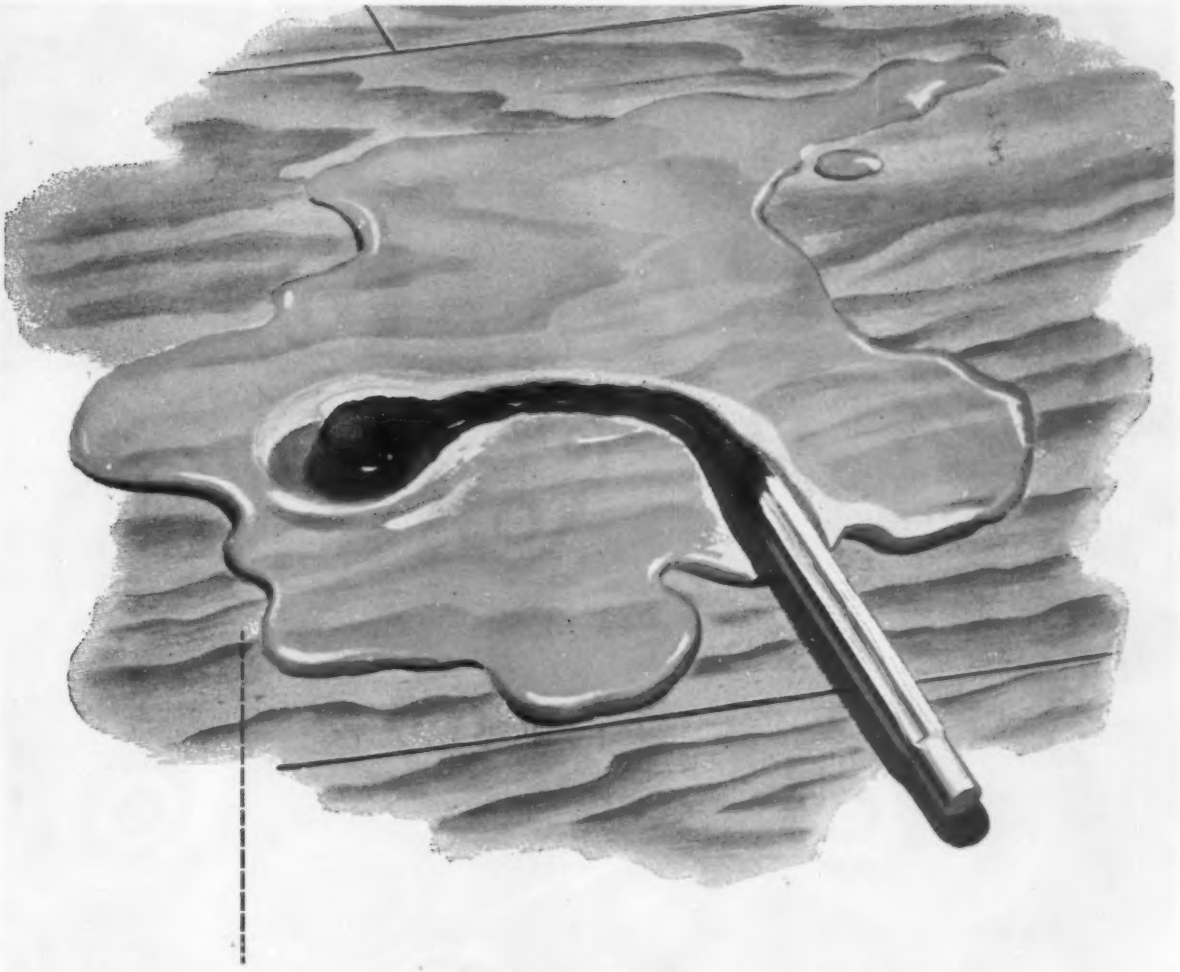

An economical hydraulic fluid that actually snuffs out fire!

WHEREVER a fire hazard exists near a hydraulic system, you can greatly reduce this hazard without excessive costs by specifying Shell Irus Fluid 902. This new hydraulic fluid is a "snuffer" type fluid with water dispersed in oil.

Because Irus* Fluid 902 is economical, many plant operators have found they save thousands of dollars yearly when the changeover is made. And they obtain performance which is unsurpassed by much higher priced fire-resistant fluids.

For complete information on Shell Irus Fluid 902 write to Shell Oil Company, 50 West 50th Street, New York 20, N. Y., or 100 Bush Street, San Francisco 6, California.

*Trademark

SHELL IRUS FLUID 902

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For more information circle No. 72 on the Reader Service Card

Glidden formula for your profit:

CHANGE METAL POWDER TO PRECISION PARTS

Proved way to cut costs on high-volume production of precision parts: Glidden Powder Metallurgy! That's why Glidden *Resistox*® Metal Powders are so widely used for bearings, friction materials, brushes and other parts.

Leading fabricators like The United States Graphite Company, Division of the Wickes Corporation, Saginaw, Michigan (producers of GRAMIX® sintered metal parts), look to Glidden as a primary source for metal powders.

Resistox Metal Powders meet all standards for purity and consistency. And a much greater resistance to oxidation gives *Resistox* 5 to 10 times the stability of ordinary metal powders!

Perhaps Glidden can help you find a cost-cutting solution to your metal parts production problems.

Write now for more detailed information.

THE GLIDDEN COMPANY

Chemicals - Pigments - Metals Division

CHEMICALS PIGMENTS METALS

QUALITY Glidden PRODUCTS

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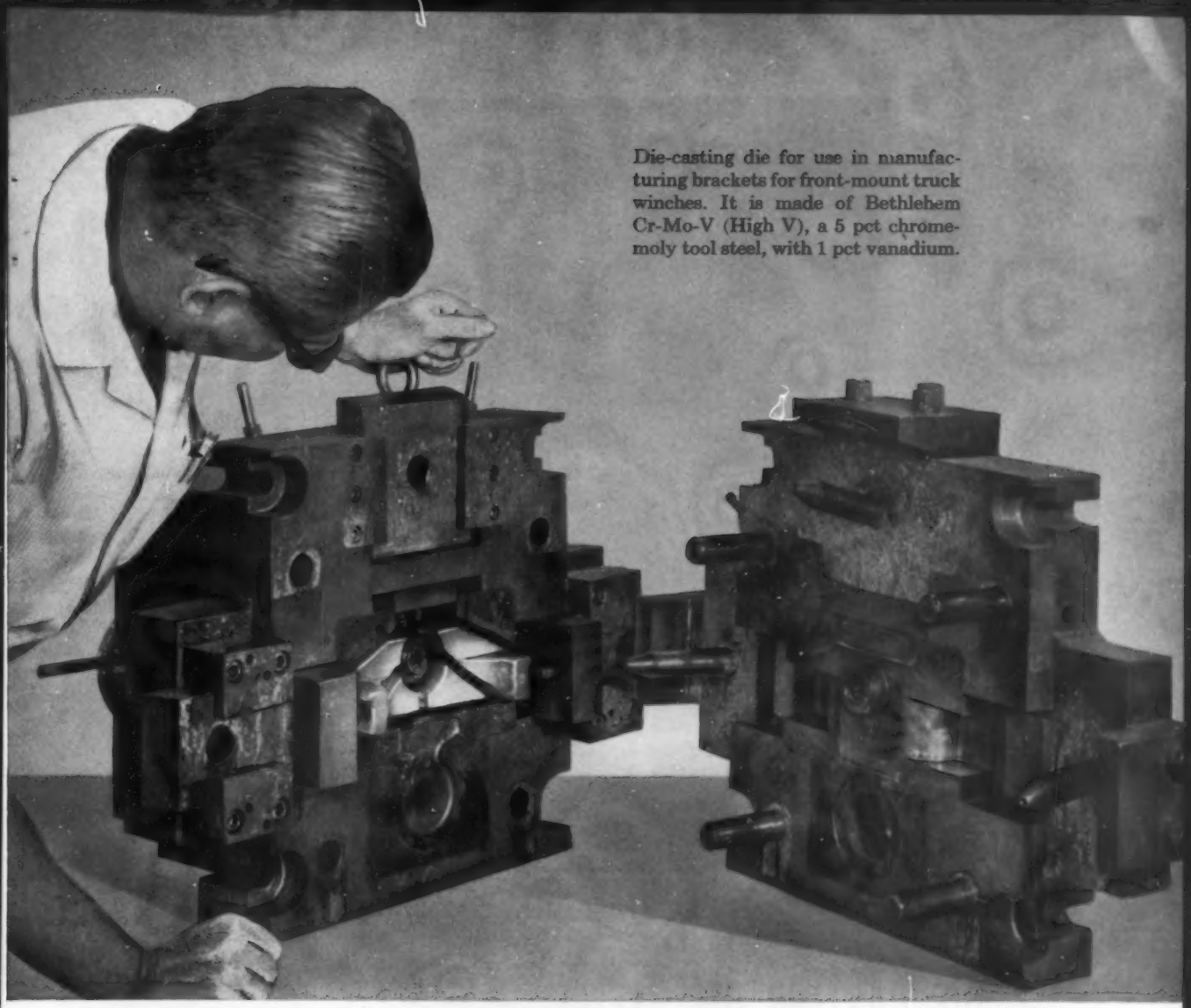


Die-casting die for use in manufacturing brackets for front-mount truck winches. It is made of Bethlehem Cr-Mo-V (High V), a 5 pct chrome-moly tool steel, with 1 pct vanadium.

DIE: Cr-Mo-V (HIGH V)
PROSPECT: Long Production Run

Here, undergoing inspection at Production Die Casting Company, Houston, Texas, is a die-casting die for use in manufacturing brackets for front-mount truck winches, being produced by Koenig Iron Works, Inc., also of Houston. Engineers at Production Die Casting Company know they can count on the die for long, economical service because it's made of Cr-Mo-V (High V)—Bethlehem's 5 pct chrome-moly tool steel, with 1 pct vanadium.

Cr-Mo-V (High V) stands up in long production runs because it's a high-quality steel, with good grain-refinement, uniform center-density and freedom from porosity. It also makes possible dies which can be polished to a high lustre and impart a smooth surface to the casting. Because of its balanced analysis and high vanadium, it affords good resistance to surface washing and erosion. And as for cleavage-cracking, that's no problem at all when adequate radii are used in the die and the steel is properly heat-treated.

Cr-Mo-V (High V) is made by means of a controlled melting procedure, plus adequate forging reduction. Its high quality is double-checked by means of ultrasonic testing. It's easy steel to machine because it is annealed to Brinell 217 max. What's more, it responds uniformly to heat-treatment, even in massive sections, producing a uniform hardness of Rockwell C 45-47.

If you have any questions about Cr-Mo-V (High V), whether casting aluminum, zinc or magnesium, call your Bethlehem tool steel distributor.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

For more information circle No. 17 on the Reader Service Card

Photo by Hedrich-Blessing

Prompt delivery

of **DIE CASTING DIE STEELS** from warehouse stocks

...every piece ultrasonically inspected

Crucible warehouses from coast to coast stock over 460 sizes of CSM 2 and NU DIE V die casting die steels—1″ to 40″ wide—¾″ to 15″ thick! And they're all available for *prompt* delivery.

What's more Crucible warehouses are equipped to cut die steels to the size you want. The hacksaw pictured above in one of Crucible's warehouses, for example, is the largest made. It can accurately cut die blocks up to 40″ x 25″.

Huge stocks, plus versatile sawing and handling facilities, mean you get the steel you want *when you want it.* There's no need to wait for delivery from mill or forge shop when you can get *prompt* delivery from Crucible warehouse stock.

But there's more. Ultrasonic inspection of *every* piece of Crucible die casting die steel assures *sound die steel quality* every time. So next time you need die steels, look no further than your nearest Crucible warehouse. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

For more information circle No. 28 on the Reader Service Card

SMALL MIRROR PART REFLECTS 66% SAVING: GRC DIE CASTING ELIMINATES SCRAP LOSS

Brass screw machine part made from bar-stock meant big scrap loss, high cost; Gries die cast part means no scrap loss; costs only ⅓rd as much!

This rear view mirror component was an expensive part of the assembly when made of brass because so much costly metal was completely lost in machining (see diagram). Gries' die casting of the same part for Roberk Mfg. Co., Norwalk, Conn., completely eliminates the scrap loss. In addition, Gries' design flexibility permitted casting the part with a "material-saver," for further cost reduction. The brass part actually was 3 times more costly than the Gries zinc die cast part!

GRC's exclusive die-casting methods produce finished tiny parts, trimmed, ready-for-use, in one high-speed automatic operation . . . at low, *low* tool cost. The rear view mirror part is being die cast less wastefully, less expensively, and more uniformly, at high production rates.

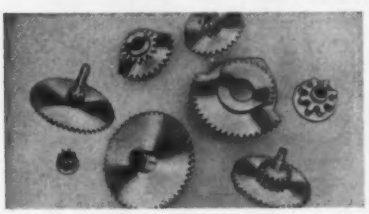
Gries' unusual techniques and special facilities permit almost unlimited design latitude. No part is too small—maximum weight, ½ ounce; maximum length 1¾ inches. Economical mass production — from 100,000 to many millions — assures lowest costs.

Send for your copy of Gries' new informative Die Casting Bulletin

BRASS SCREW MACHINE PART
showing scrap loss

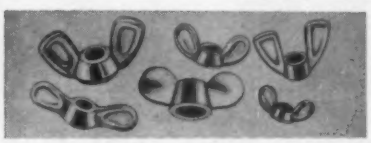
GRC DIE CASTING
designed for minimum metal usage

GRC DIE CASTS GEARS AND PINIONS IN ONE PIECE FOR LOWER UNIT COSTS



Lower cost, improved design, faster production is possible because GRC gears and pinions are die cast in *one* piece. These one-piece zinc alloy assemblies can be die cast with shafts or center holes, or in combination with cams, hubs, spacers, flanges, etc. Many combinations are available from stock dies for less precise applications at no tool charge. Special designs and close-tolerance requirements are produced at nominal tool charges.

Maximum size of Gries' gears and pinions is 1-5/16" O.D. x 1/16" face width; on the smaller diameters wider faces can be furnished. They are available in quantities from 100,000 to millions. Write for catalog sheet, samples.



GRC MAKES WIDEST RANGE OF WING NUT TYPES AND SIZES

Mass produced in the widest selection of stock sizes to fit all cost and application requirements, GRC wing nuts are also available in many types to meet unusual requirements. These include wing nuts with high, low or narrow wings to meet space limitations — and with serrated base for locking action, in many applications. All have finger-grip recessed wings, exclusive with Gries.

GRIES HAS COMPLETE FACILITIES FOR SECONDARY OPERATIONS

In most cases, Gries' die cast zinc alloy parts need no secondary operations. However, GRC has full facilities for tapping, threading, drilling, reaming, special machining and assembling, when needed. Gries' Finishing Department has special mass-production facilities for the application of surface finishes to small die-cast parts. Special methods are used for most commercial finishes, including electroplating, barrel-finishing and chemical treatments.

WORLD'S FOREMOST PRODUCER OF SMALL DIE CASTINGS

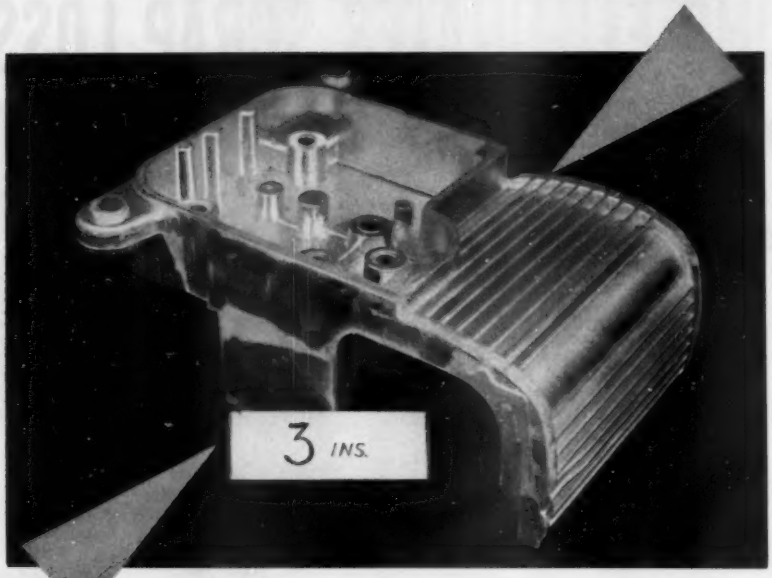
GRIES

GRIES REPRODUCER CORP.

157 Beechwood Ave., New Rochelle, N. Y. • NEw Rochelle 3-8600

For more information circle No. 41 on the Reader Service Card

You can SEE the difference . . . with **FOSECO DYCOTES**



an example of the excellent surface finish you can have with FOSECO Dycotes

FOSECO Dycotes provide an extensive range of coatings for both permanent mold and die casting work. Special grades are available for billet and slab production, centrifugal and chill molds.

Why you should use FOSECO Dycotes . . .

FOSECO Dycotes

- . . . *greatly improve surface finish*
- . . . *increase production*
- . . . *improve die life and reduce maintenance costs*
- . . . *help to control casting solidification*
- . . . *produce medium to highly finished surfaces*
- . . . *come in grades for all metals*
- . . . *save you time and money*

We don't have space to give you all the facts on FOSECO Dycotes here. So, we've prepared a leaflet giving all the facts on how FOSECO Dycotes can help solve your permanent mold and die casting coating problems. Just send this coupon and you will receive, free of charge, your copy of the FOSECO Dycotes leaflet.

FOUNDRY SERVICES, INC.

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In Canada: FOUNDRY SERVICES (CANADA) LTD., 201-7 Alice St., Guelph, Ontario

Send this coupon for your free leaflet giving all the facts about FOSECO Dycotes.

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Company_____

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City_____ State_____

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LETTERS

the readers' forum

COST ACCOUNTING

In our factory we have a department in which we make powdered metal parts. We have seven presses and four sintering furnaces. The possible production is more than we can use in our production and we are attempting to secure orders for this type of material.

We understand that an article appeared in your magazine in the last 18 months discussing costing of such powdered metal items.

If you can locate this article and let us have a copy of the issue it would be very much appreciated. H.F.L. vice-president.

The article is "What Goes Into The Cost Of A Powdered Metal Part", by Albert L. Fox and was published in PMM in May 1955. A copy has been sent to H.F.L.—Ed.

SHEATHED HEATERS

In the December, 1956 issue of PRECISION METAL MOLDING, we saw an article on shell molded heater castings with tubular sheathed heating elements cast as inserts.

We are interested in knowing how the electrical insulation is maintained between the heating element and the casting. R.G.deL., Gen. Mgr.

Information sent.—Ed.

IRON MASTINGS

Please advise if you can recommend some-one here in the East, who could make cast iron housings for our oil burners. R.S.

The names of several foundries who do permanent mold and shell mold casting have been sent.—Ed.

BRASS DIE CASTING

We have a customer who is interested in brass die casting. Do you have available any past articles, information or books that would help us to assist this customer in this casting process. J.C.P.—vice president.

Information sent.—Ed.

OILITE POWDER METAL COMPONENT DOES "TRIPLE DUTY" IN POWER MOWER

Another cost-saving application of Amplex Powder Metallurgy

How to make a self-propelled rotary mower more compact and still permit the rotary blade to operate while the mower idled—*without increasing costs!* That was the problem company engineers tackled. One way was to combine three components—over-running clutch, oil pump piston cam, differential—into one. They experimented widely with designs and materials. Result: an OILITE powdered bronze worm gear with one side of the hub a cam operating the oil pump, the other side a wheel drive ratchet. (The other half of the ratchet—fixed to the drive shaft— OILITE powdered iron.) The design achieved the desired compactness and idling characteristics. OILITE powder metallurgy achieved a *major reduction* in cost, an *increase* in serviceability.

Do you have a design problem? Maybe Amplex has the answer. Write for detailed information about Amplex powder metal components—OILITE Bearings, Parts, Filters. Or call your nearest engineering representative listed in the yellow pages under "Bearings—OILITE."

Representatives and dealers located in principal cities in United States and Canada.

A CHRYSLER OILITE PRODUCT

Only Chrysler Makes **OILITE**

AMPLEX DIVISION

CHRYSLER CORPORATION • DETROIT 31, MICHIGAN

New 24 page OILITE bronze bearing stock list. Contains over 1000 sleeve, flange and thrust bearings—cored, bar and plate stock —engineering data. Write for booklet S-56. Address Dept. 3F.

Bearings • Finished Machine Parts • Permanent Metal Filters • Friction Units

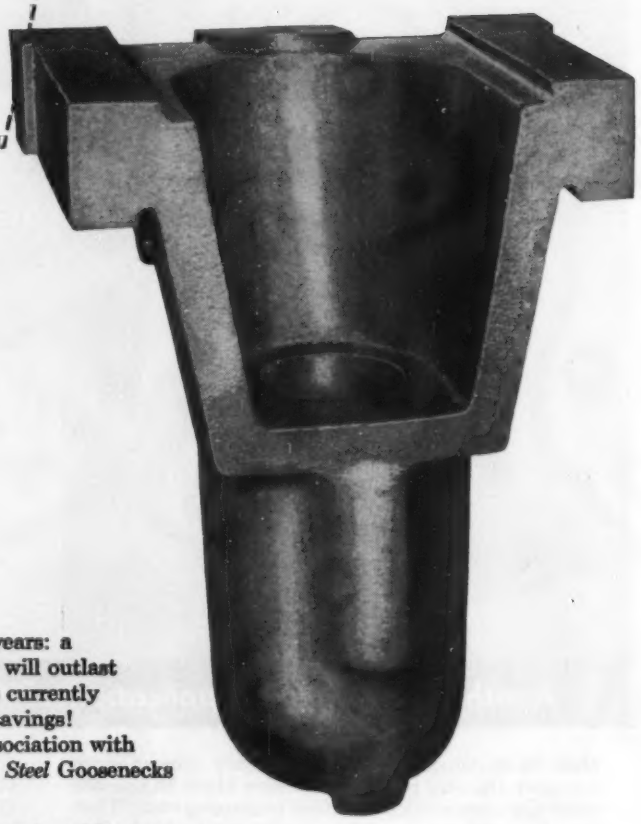
Ferrous and Non-Ferrous Metals

For more information circle No. 25 on the Reader Service Card

Dodge Custom-made **Special Alloy Steel Goosenecks**

for longer service life

less maintenance



Here's the biggest news in die casting in years: a custom-made special alloy *steel* gooseneck that will outlast and outperform iron and alloy iron goosenecks currently available . . . and provide greater operational savings! Developed through years of experience and association with the die castings industry, Dodge Special Alloy *Steel* Goosenecks provide many advantages:

- Will outlast iron and alloy iron goosenecks by as much as 4-5 years.
- Maintenance problems are fewer because of long service life.
- Down time is reduced to a minimum because of long service life.
- Designed and made of special alloy steel, they prevent cracking . . . bottom breakout . . . spout erosion.

Each Dodge Special Alloy *Steel* Gooseneck is custom made to specifications by the Finished Products Division of Dodge Steel Company. Facilities are available for producing any size gooseneck for any die casting machine. Goosenecks are furnished either rough machined or machined with sleeves. Dodge provides a complete engineering service in the designing and production of steel goosenecks. Your inquiries are solicited, without obligation, of course. Ask too, about pots and other die casting machine parts including nozzles, spouts, plungers, etc.

DS

DODGE STEEL COMPANY

Finished Products Division

6501 Tacony Street • Philadelphia 35, Pa.

THE MOST IMPORTANT ALLOY IN A STEEL CASTING IS QUALITY

For more information circle No. 31 on the Reader Service Card

it's

CRUCIBLE REXALLOY

for abrasion, corrosion and heat resistant parts...with better finish

1. One of a pair, this blade of REXALLOY A shears hot glass during manufacture of TV tubes. Liquid cooled between operations, it offers maximum resistance to wear, corrosion, and thermal shock. REXALLOY blades outperform previously used high speed steel shears by a wide margin.

2. Nozzle for jet type oil well rock bit cutter. Made of REXALLOY 51, it stands up exceedingly well under severe cold abrasive conditions encountered in drilling oil wells.

3. Extrusion die insert of REXALLOY 33. Inside contours are cast within a few thousandths of finished size. REXALLOY inserts produce as many as six to ten times as many pushes as conventional hot work tool steel extrusion dies.

Here's what Crucible REXALLOY means to you: Castings of high hardness, even at elevated temperatures . . . excellent resistance to both corrosion and abrasion . . . smooth, clean finish.

What's more, REXALLOY castings, when made by the shell-mold process, can be cast to any shape. Dimensions are held to closer tolerances than ever before . . . practically all machining and grinding operations are eliminated—especially important with hard super-alloys like REXALLOY.

So if your application calls for a part with one or more of these characteristics, REXALLOY shell-molded castings are the answer. They are moderate in price (less than investment castings), closer in dimensions and finish than conventional castings. Let your Crucible representative give you the complete story of what they can do for you. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

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now...

LINDBERG-

FISHER

Electric

RESISTANCE

FURNACE WITH...

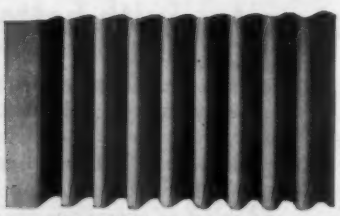
CORRTHERM

HEATING ELEMENT

For permanent mold, sand casting, and die casting of aluminum, magnesium, zinc and lead, Lindberg-Fisher now offers its improved Electric Resistance Furnace with the revolutionary new CORRTHERM Heating Element.

Lindberg-Fisher ER Furnaces have, time and again, meant lower cost per lb. of finished casting. And with practically indestructible CORRTHERM elements, lower furnace maintenance costs and longer crucible or pot service assure you of even greater savings.

These furnaces eliminate localized heating of metal, and gas absorption, because no products of combustion are present. No exhaust fumes or smoke means less operator fatigue and higher production. Investigate the advantages of this furnace. Write for Bulletin No. 321.



CORRTHERM elements are large sheets of nickel chromium. They are easy to install, just hang in furnace, and operate at extremely low voltages, completely eliminating shock or short hazards.

LINDBERG FISHER **MELTING FURNACES**

A Division of Lindberg Engineering Company

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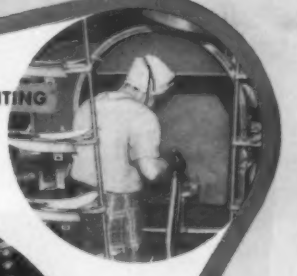
DIE CASTING NEWS



INTEGRATED FACILITIES

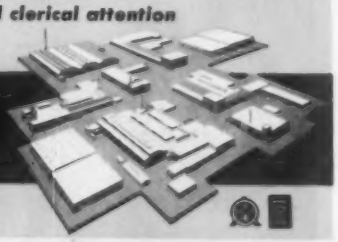
One Supplier---
No Division of Responsibility!

Wise Managements Save:

- ✓ **TIME**
- ✓ **MONEY**
- ✓ **MACHINES**
- ✓ **MATERIALS**
- ✓ **MANPOWER**

--BY TAKING ADVANTAGE OF PRECISION'S INTEGRATED FACILITIES, YOU AVOID--

- ***Shipping between suppliers***
- ***Rehandling of parts in your plant***
- ***Multiple inspections***
- ***"Passing the buck" on quality***
- ***Overburdening your own machine shops***
- ***Extended lead time***
- ***Paperwork and clerical attention***



PRECISION CASTINGS CO.
DIVISION OF HARSCO CORPORATION

FAYETTEVILLE, N. Y. – SYRACUSE, N. Y. – CORTLAND, N. Y. – CHICAGO, ILL.
CLEVELAND, OHIO – KALAMAZOO, MICH. – DETROIT, MICH. – ROCKFORD, ILL.

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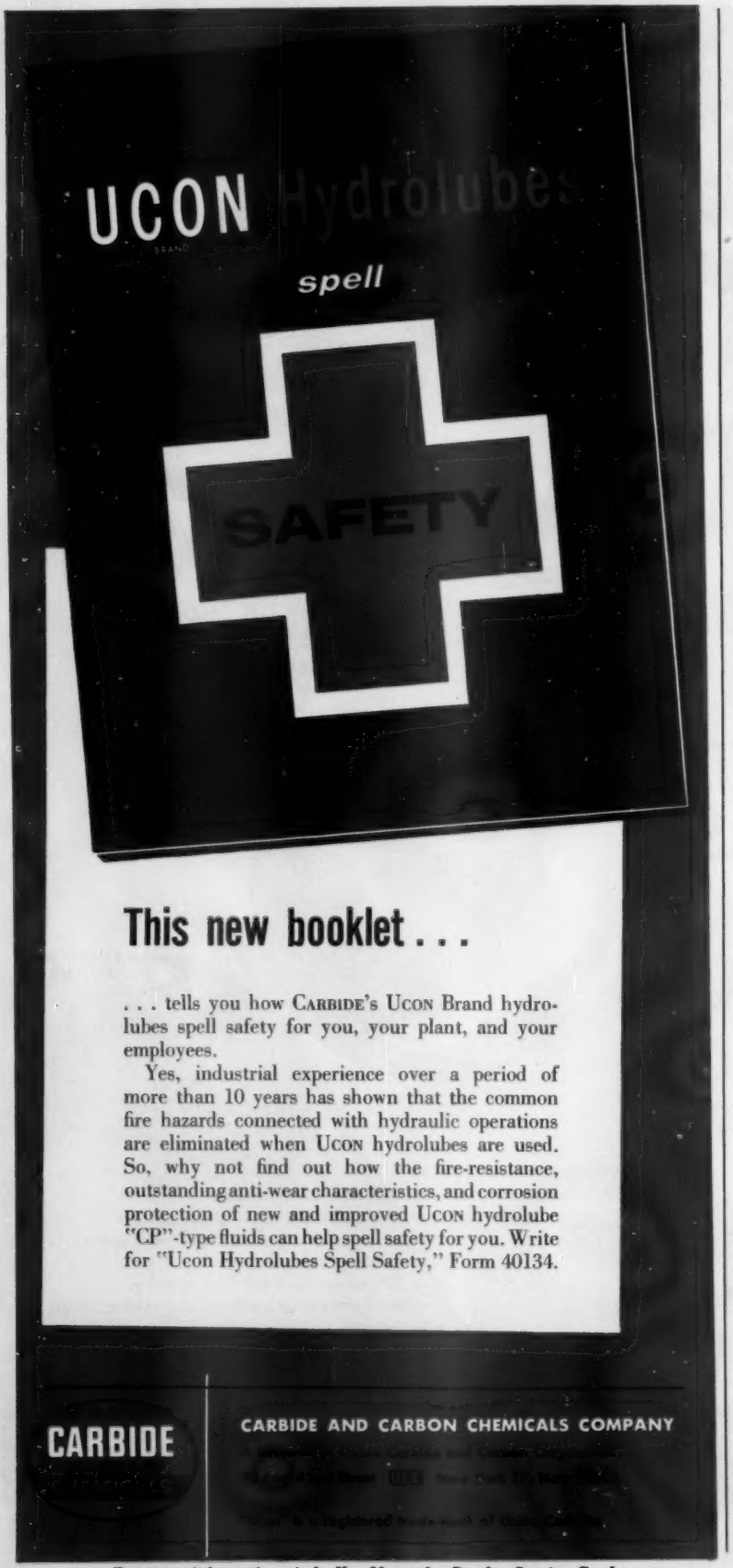
UCON Hydrolubes
spell
SAFETY
This new booklet . . .
. . . tells you how CARBIDE's UCON Brand hydrolubes spell safety for you, your plant, and your employees.
Yes, industrial experience over a period of more than 10 years has shown that the common fire hazards connected with hydraulic operations are eliminated when UCON hydrolubes are used. So, why not find out how the fire-resistance, outstanding anti-wear characteristics, and corrosion protection of new and improved UCON hydrolube "CP"-type fluids can help spell safety for you. Write for "Ucon Hydrolubes Spell Safety," Form 40134.
CARBIDE
CARBIDE AND CARBON CHEMICALS COMPANY

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PATENTS

Copies of all patents reviewed can be secured from U. S. Patent Office, Dept. of Commerce, Washington, D. C. for 25¢ each.

METHOD FOR CURING shell molds to maintain constant contact between the pattern plate and the shell mold. After the excess sand-binder mixture has been removed from the shell, the partially cured material, in contact with the heated pattern, is inverted over a bed of hot refractory material. The refractory material is of such nature that it will not adhere to the shell and is heated by passing hot gas through it. The gas velocity is sufficient to keep the refractory bed in a fluidized condition so that when the partially cured shell is brought in contact with the hot material, a constant and uniform pressure is applied against the shell to maintain it in close contact with the pattern. The refractory bed must be maintained at constant temperature to effect uniform and proper curing. After curing is completed the shell mold is stripped from the pattern.

U. S. Patent No. 2,771,648—Curing Shell Molds in Fluidized Beds—Emery I. Valyi—issued Nov. 27, 1956.

A SHELL MOLD RELEASE material to be applied to a metal pattern. The metal pattern is heated to at least 250F and then coated with a mixture of carnauba wax, an emulsifier and water. The water is a major part of the mixture used.

U. S. Patent No. 2,770,859—Method of Treating A Metallic Pattern for Shell Molding—Donald J. Henry—assigned to General Motors Corp.—issued Nov. 20, 1956.

A SHELL MOLD making machine which has an endless conveyor system to carry the pattern plates, a rotating drum with a number of aperatures and an oven. The conveyor is arranged so that a portion of its travel is a portion of the periphery of the drum and the balance of the path through the oven. The apertures in the drum correspond in size to the size of the pattern plates.

(Patent No. 2,724,879—Machine For Manufacturing Shell Molds—Herbert Corliss Fischer—issued Nov. 29, 1955—15 claims.)

NEW HAMMARLUND RADIO RECEIVER

FEATURES DIE CAST PANEL

CASE HISTORIES FROM MT. VERNON FILES

In their new HQ-100, Hammarlund Manufacturing Company brings to reality a completely new concept in receiver design. It is beautiful. It gives the radio amateur the utmost in performance. And it sells for far less than other comparable short-wave receivers.

A chief reason for this great economy is the front panel—the first die-cast panel in the history of commercial radio equipment. This 3-dimensional, channeled die-cast aluminum panel is used because it affords both rigidity and great structural strength. To produce its equivalent in sheet metal —the currently used method in the industry—*would cost 4 times as much.*

This remarkable panel is the result of thorough collaboration between Hammarlund and the die-making experts at Mt. Vernon, who made practical suggestions which simplified its design.

In addition to the production economies of die casting, the panel benefits from these other important advantages: (1) Die casting's inherent accuracy enables Hammarlund to assemble the chassis with what they call "camera precision construction." (2) All rejects on the production line are eliminated. (3) In finishing—die casting enables them to work out clearly divided areas for the elegant two-tone treatment that is both functional and beautiful. Also, the amount of finishing is minimized.

When you are out to break precedent, as Hammarlund did, you too can find the kind of skilled help you need in the complete service available from Mt. Vernon's coordinated designing, die-making, casting, and machining facilities, all under one roof, which can supply die cast zinc and aluminum parts ready for use. A switch to a die casting service like ours may be your next step. Let's discuss it.

MT. VERNON
DIE CASTING CORP.
STAMFORD, CONNECTICUT

SALES REPRESENTATIVES

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6 East 194th St., Cleveland, Ohio

Mr. Jerome J. Theobold
9 East Genesee St., Skaneateles, N. Y.

Mr. Arthur Diamond, Tools Incorporated
86 Bethlehem Pike, Philadelphia, Pa.

Mr. Anker Anderson
Cascade Road, Stamford, Connecticut

Mr. William Sauers
101 Briarcliff Road, Rochester, N. Y.

Mr. David King
230 Grant Boulevard, Syracuse, N. Y.

Mr. George E. Hahl
39 South Munn Ave., East Orange, N. J.

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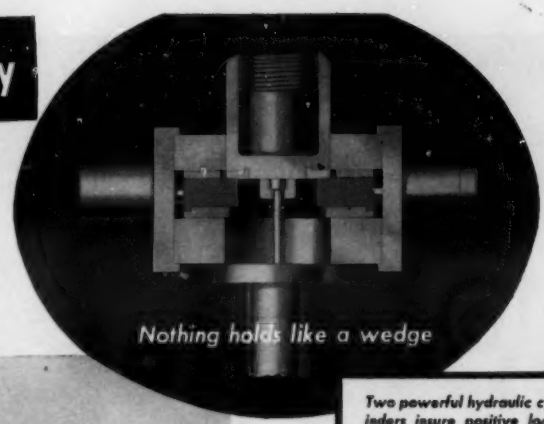
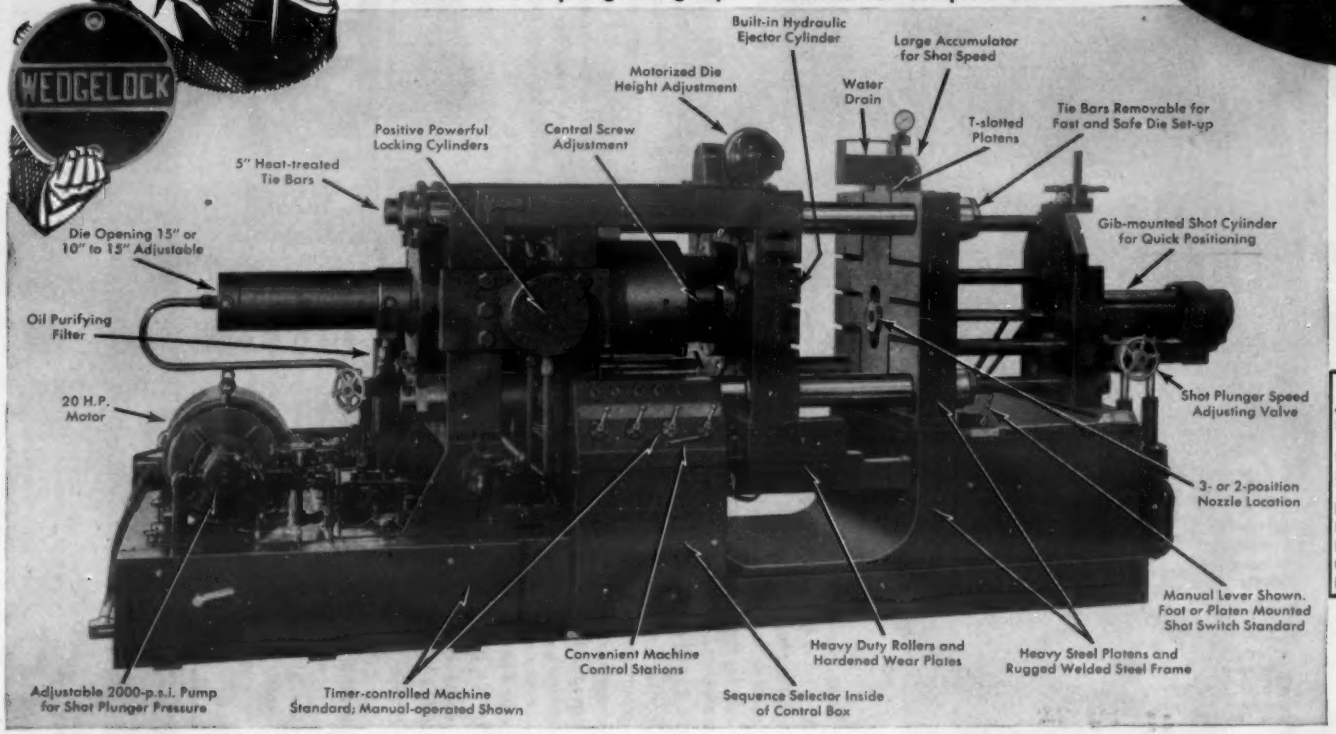
Only WEDGELOCK gives you this DOUBLE Efficiency

WEDGELOCK POSITIVE LOCKING PRESSURE

WEDGELOCK PLATEN ADJUSTING SCREW

For the ultimate in die casting uniformity, density and usable production, investigate Wedgelock, now in its tenth year. Safe pressures in the shot plunger range up to 40,000 lbs. Die adjustments are easily made to .001". Central hydraulic ejection speeds operation. Other major features. Ask on your letterhead for complete bulletin.




Built-in Hydraulic Ejector Cylinder
Large Accumulator for Shot Speed
Motorized Die Height Adjustment
Water Drain
T-slotted Platens
Tie Bars Removable for Fast and Safe Die Set-up
Positive Powerful Locking Cylinders
Central Screw Adjustment
5" Heat-treated Tie Bars
Gib-mounted Shot Cylinder for Quick Positioning
Die Opening 15" or 10" to 15" Adjustable
Oil Purifying Filter
20 H.P. Motor
Shot Plunger Speed Adjusting Valve
3- or 2-position Nozzle Location
Manual Lever Shown. Foot or Platen Mounted Shot Switch Standard
Convenient Machine Control Stations
Heavy Duty Rollers and Hardened Wear Plates
Heavy Steel Platens and Rugged Welded Steel Frame
Adjustable 2000-p.s.i. Pump for Shot Plunger Pressure
Timer-controlled Machine Standard; Manual-operated Shown
Sequence Selector Inside of Control Box

Two powerful hydraulic cylinders insure positive locking; result—dense, solid castings. Higher pressures can be applied without the die faces blowing open.

SPECIFICATIONS	Model A-32-10	Model A-36-15	Model A-42-16
Size of platen (width x height)	32" x 30"	36" x 34"	42" x 42"
Dia. of tie bars	4½" Dia.	5" Dia.	6" Dia.
Space between bars (width x height)	19¼" x 17½"	23" x 21"	26" x 26"
Die opening	10"	15"	16"
Maximum die space	22"	25"	32"
Minimum die space	14"	16"	20"
Cap. per shot (⅔ full)	7 lbs.	10.8 lbs.	15 lbs.
Die-locking tonnage	400	600	750

CUYAHOGA INDUSTRIES, INC. 17920 WATERLOO ROAD • CLEVELAND 19, OHIO

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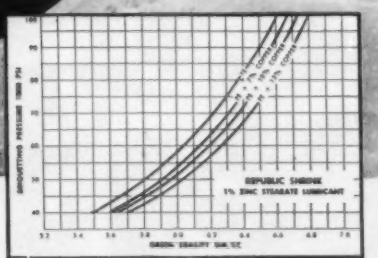
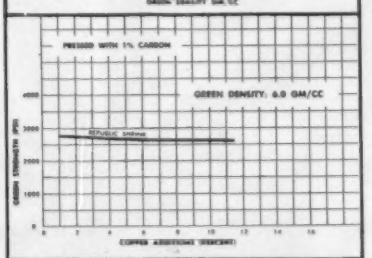
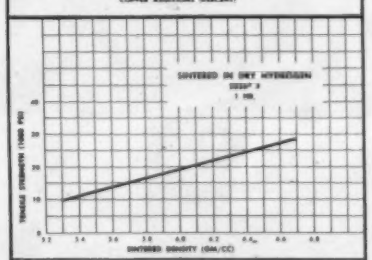
NEW Type "S" (Shrink)

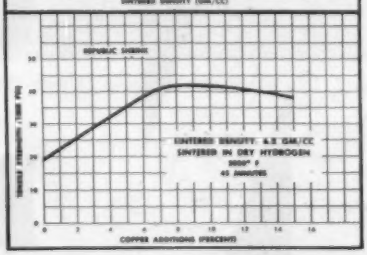
REPUBLIC IRON POWDER WITH

Controlled dimensional factor









Permits use of worn and oversize dies without need for extensive re-working

Up to now, fabricators of iron powder parts have been plagued with the problem of what to do with dies that have become oversize through wear. They have had a costly choice of either reworking the dies or disposing of them.

Republic's Metal Powder Division has solved this problem with the development of a new grade of iron powder, designated as Type "S" for shrinkage.

This powder has an extremely high shrinkage characteristic and can be used to attain certain tensile strengths with lesser quantities of copper. This characteristic is called *Controlled Dimensional Factor*—an exclusive Republic development. Type "S" powder makes possible the production of parts to *original dimensions* without the need for extensive or expensive re-working of dies.

Illustrated left are curve charts representing the average of numerous tests conducted during the development of this new powder. All values are the result of sintering in a dry hydrogen atmosphere. One percent zinc stearate was used as lubricant in all cases.

Complete information on Type "S", Type "N" for normal, and Type "G" for growth is contained in our new technical booklet "Republic Iron Powder with Controlled Dimensional Factor". Write for it. Ask for Republic Booklet Adv. 763.

REPUBLIC STEEL

Metal Powder Division • Toledo 5, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

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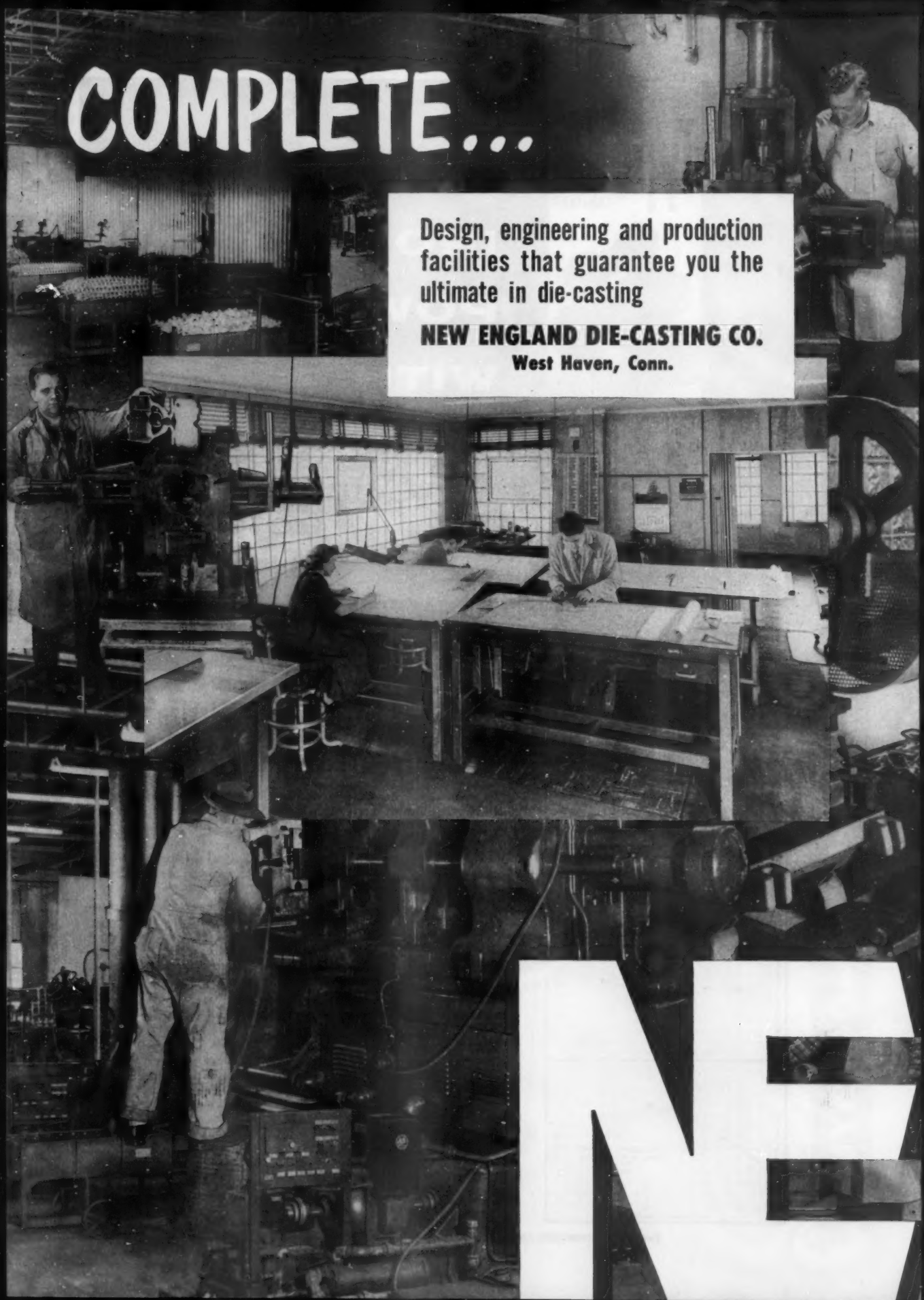

COMPLETE...
Design, engineering and production facilities that guarantee you the ultimate in die-casting
NEW ENGLAND DIE-CASTING CO.
West Haven, Conn.
NE

PLASTER MOLD CASTINGS

Complex contoured surfaces . . . precise matching high dimensional accuracy with . . .

Aluminum Castings From Plaster Molds

MISSILE FIN cast to aerodynamic finish and dimensions.

THE Antioch Process of plaster mold casting as employed by Morris Bean & Co. is pre-eminently suited for making every aluminum castings having dimensional accuracies completely impossible by any other method of casting. Two castings that show both the size and the accuracy possible are shown here.

Aluminum Access Door. This casting for guided missile application, provides an airfoil skin in compound contours on one side with heat collection grids integrally cast on the other side. Tolerances on the mating surface around the grid must fit the fixture within 0.010". The alloy is A 356 T51, skin thickness 0.125" and the size 3' x 5'.

Missile Fin. This aluminum casting meets aerodynamic requirements on the airfoil sections without any machining. Tolerances of —.010 on thickness and 0.015 T.I.R. on flatness are production requirements. The casting weighs 10 lbs, is 25" long and is cast in A 356 alloy. The as cast surface is less than 250 micro inches.

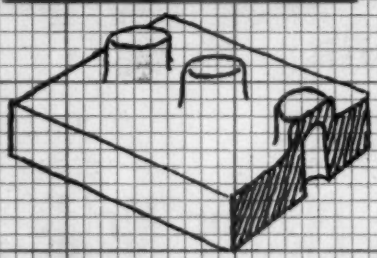
For more information circle No. 60 on Reader Service Card

Design Pointers
FOR INVESTMENT CASTINGS

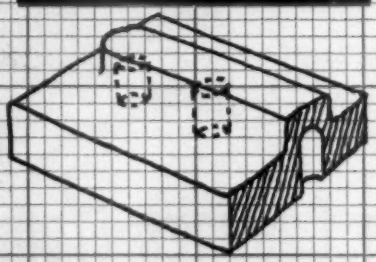
MONEY SAVERS

HERE are more practical suggestions to help you with your designs for investment castings. They can save you money, improve your product, speed up production, or help you and your investment caster to understand each other more easily. Close cooperation with your foundryman will give the best design for optimism per formance and protection.

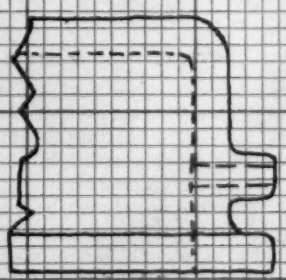
UNDESIRABLE

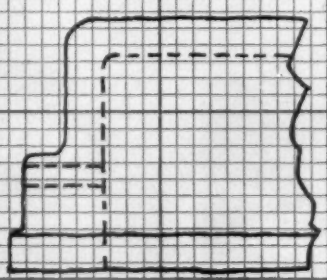


DESIRABLE

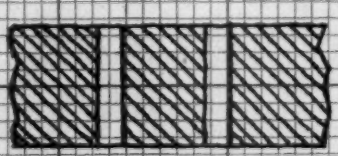


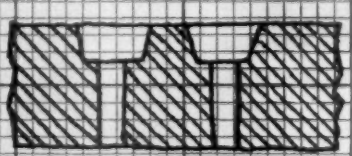
Continuous rib is better than separate bosses when coring drill spots.



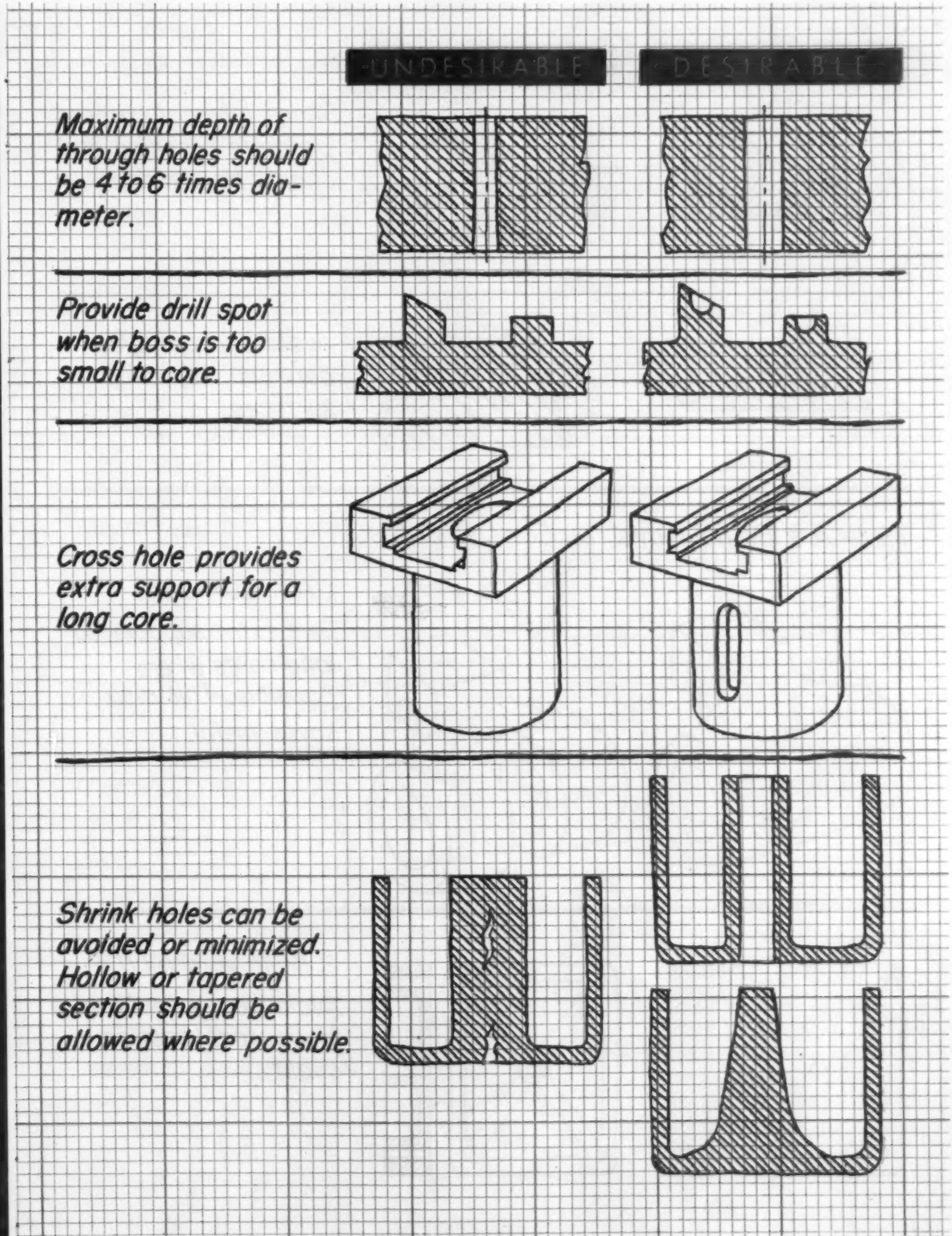


Undercuts can often be avoided by minor re-design.

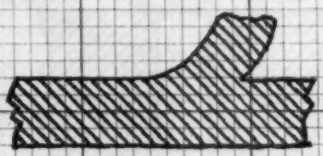




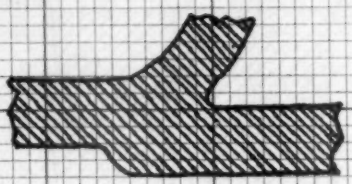
Very small cored holes are easier to cast if countersink can be allowed.


UNDESIRABLE
DESIRABLE
Maximum depth of through holes should be 4 to 6 times diameter.
Provide drill spot when boss is too small to core.
Cross hole provides extra support for a long core.
Shrink holes can be avoided or minimized. Hollow or tapered section should be allowed where possible.

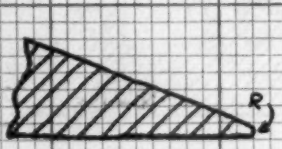
UNDESIRABLE

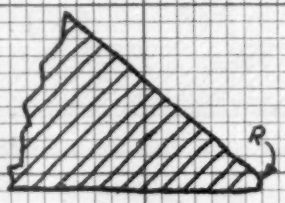


DESIRABLE



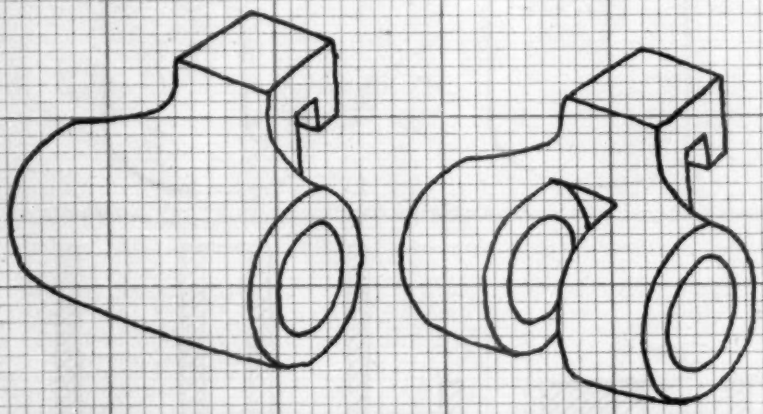
Sharp internal corners promote cracking and should be avoided.





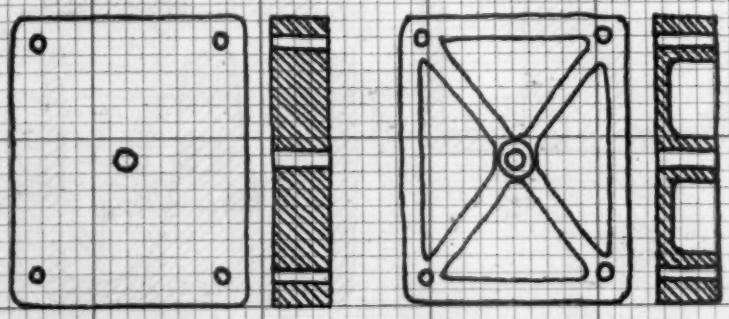
Avoid sharp angles between adjoining surfaces.

Here Are Some Ways You Can Use Cores . . . .



1. FOR SUPPORT

Give extra support to long cores where possible. This also saves metal.



2. IMPROVE QUALITY

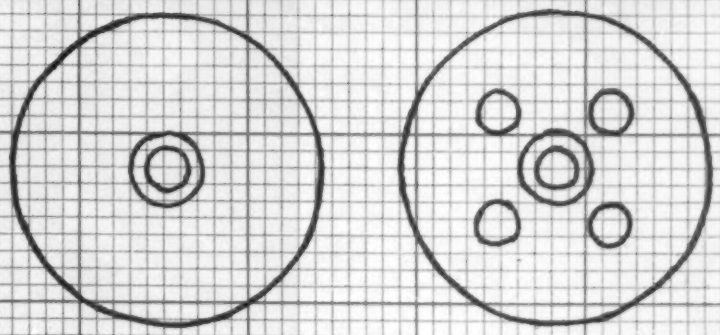
Avoid heavy sections to improve casting quality.

UNDESIRABLE

DESIRABLE

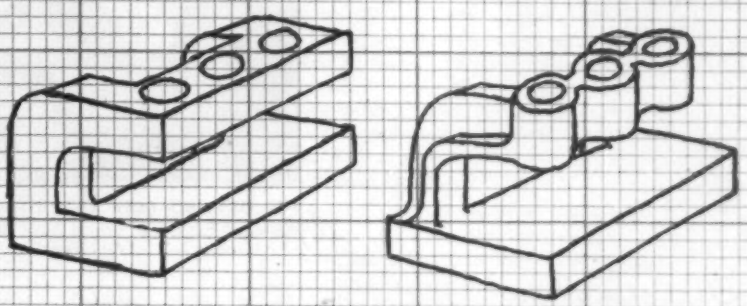
3. TO LIGHTEN

Holes cored through a section can be used to reduce mass.



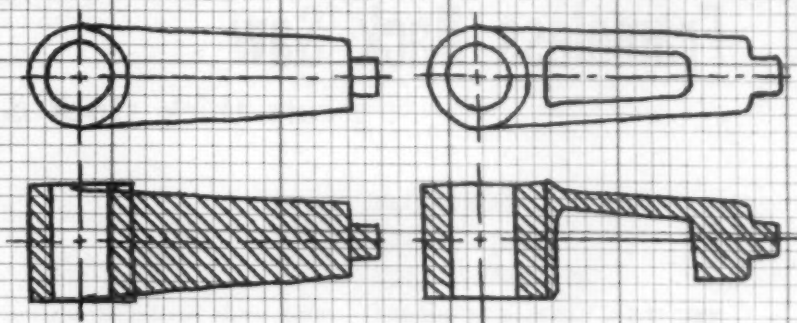
4. SAVE METAL

Unnecessary metal around holes can sometimes be eliminated.



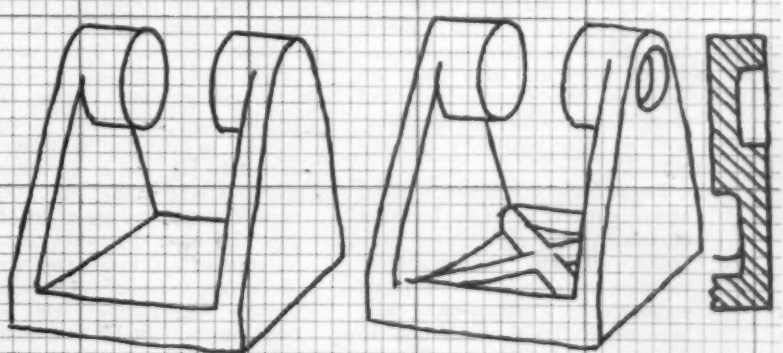
5. AVOID DISTORTION

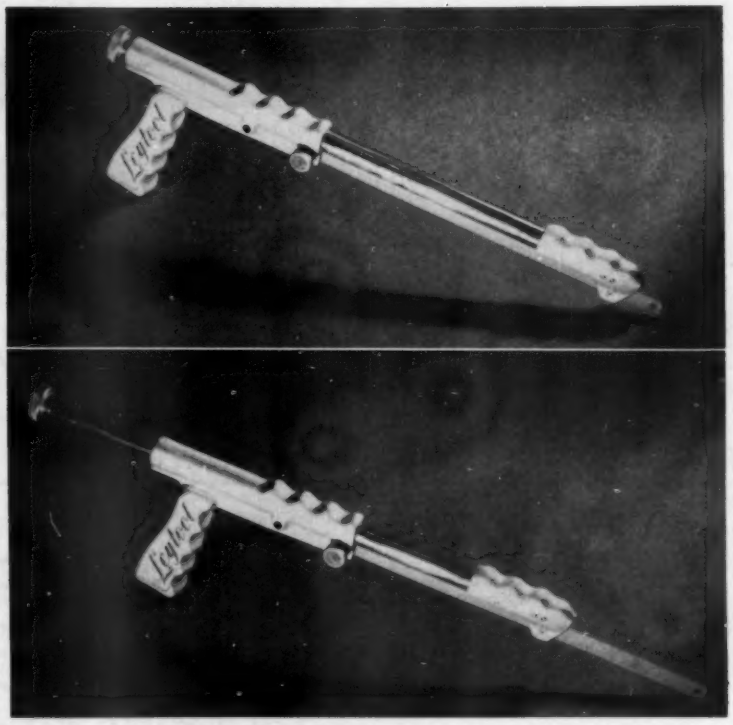
Avoid warping by coring out unusually heavy sections.



6. TO SIMPLIFY

Uniform sections can eliminate need for auxiliary casting gate.





FOR CUTTING DEEP STOCK and holes in large plate where the frame of a standard hack saw would limit the depth of cut, this saw can be used. The die cast handle and nose piece must carry the full brunt of sawing stresses.

Frameless Hack Saw

. . . cuts thick stock & holes in large plate

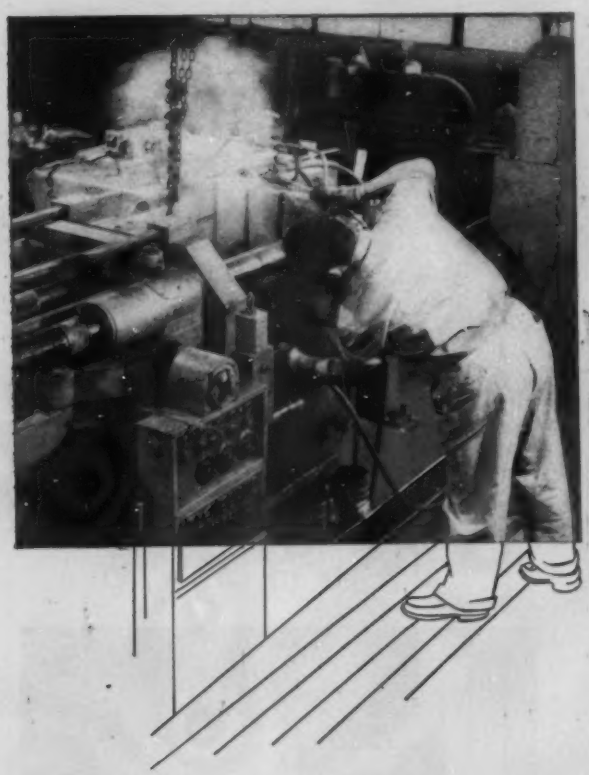
WITH a hack saw of orthodox design it is not practical to cut material thicker than the depth of the saw frame nor is it possible to cut holes in sheets and panels that are farther removed from the edge than the depth of the frame. With the newly designed Leytool hack saw, both of these objections are removed.

The success of this saw is based almost entirely upon the fact that aluminum die castings of sufficient strength and relatively complex in shape can be made economically. Further, these castings need little machining to finish them. Practically all holes are cored so that the only machine work needed is tapping. Surface finishing is also quite simple since the castings, as trimmed, are ready for painting without doing any work on the surface other than an occasional bit of flash removal.

Obviously such a saw must be designed so that it is comfortable to hold and light enough in weight for use in all sorts of positions and under all conditions. Through the use of die castings, the most desirable contour for comfort can be secured without having to resort to machining. Further, far thinner wall sections can be cast by this method than by any other; thus the weight is held to a minimum.

Quite naturally considerable stresses are developed when metal is being sawed. This is particularly true when the saw is being used by an unskilled workman. With the orthodox design a steel frame is provided which has adequate strength to handle any stresses that may be set up. In this saw all of the stresses must be absorbed by the handle casting and most of these are in shear. Again, the die casting process makes it possible to provide adequate metal to take any anticipated stress and yet allows thinning down where loads are light so that excessive weight is avoided.

dag **'dag' dispersions . . . *a touch does so much!***



'Aquadag' Cuts Rejects 30%

—*reports Bendix*

"Surface folds, gas-induced porosity and other causes for excessive rejects of die-cast turbine blades and aluminum air speed indicator frames were eliminated by the use of **'Aquadag'**, states a report from the Die Casting Department of Bendix Foundries.

'Aquadag', a dispersion of colloidal graphite in water, is sprayed over all die surfaces and recessed areas in 2-3 seconds, with die at least 250 Deg. F. The water completely evaporates before the die is closed, leaving a tough film which the molten metal will not volatilize. As a result, parts are cast to closer tolerances and with finer finish. There are no gummy deposits on dies, no build-up in recessed corners and no gaseous effects to weaken the casting. And, of course, water does not produce toxic fumes.

Frequently, one application of **'Aquadag'** lasts for 10 or more cycles. In other words, at Bendix Foundries, **'Aquadag'** helps produce superior, more uniform castings at substantial savings of time and money.

Write for Acheson Bulletin 425 on Metal Casting Operations for practical information on product improvement and lower costs in your own shop. The Acheson Service Engineer in your area will be glad to consult with you.

For ready-to-use materials containing 'dag' dispersions see your own oil supplier, or write directly to us.

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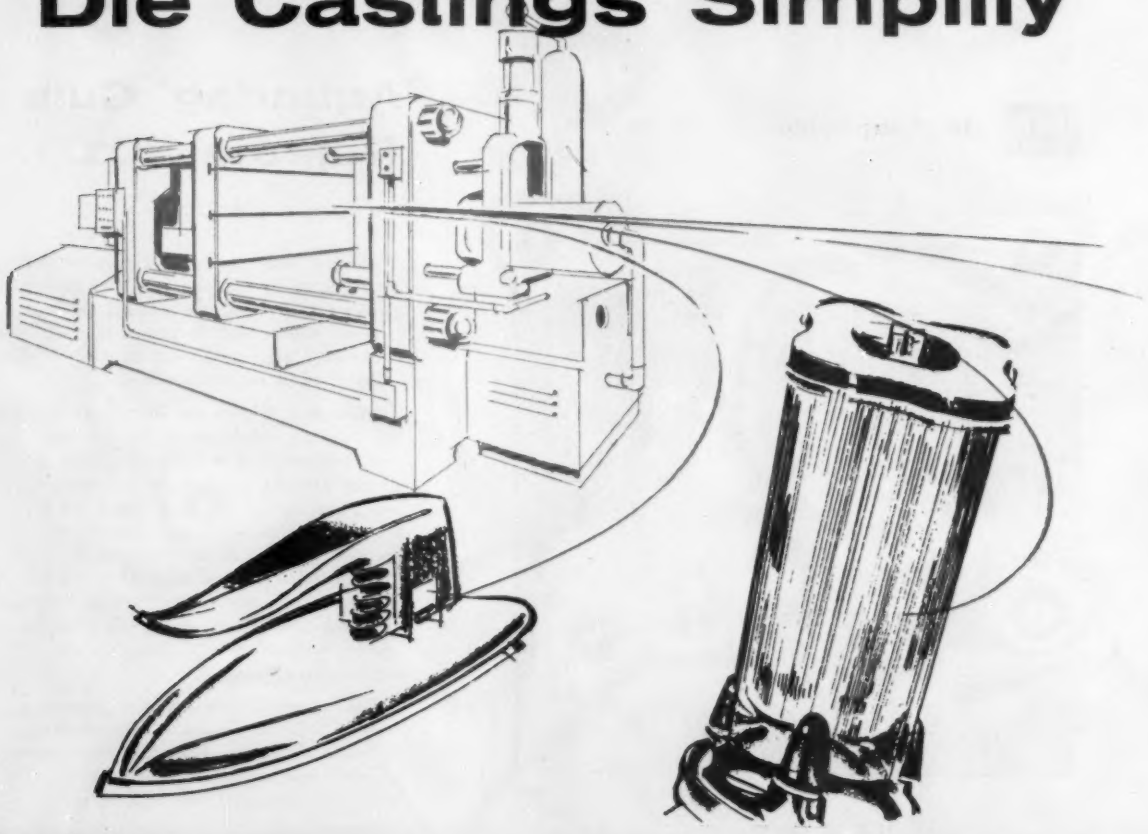
Die Castings Simplify



THE folding travel iron utilizes an aluminum die casting for the one piece sole plate. The two assembly studs on this casting are milled, drilled and tapped and the outer edges, which are exposed at assembly, are deburred, polished and buffed. When the iron is completely assembled the sole is given a final buff before packing to eliminate any tiny scratches which may have occurred in processing.

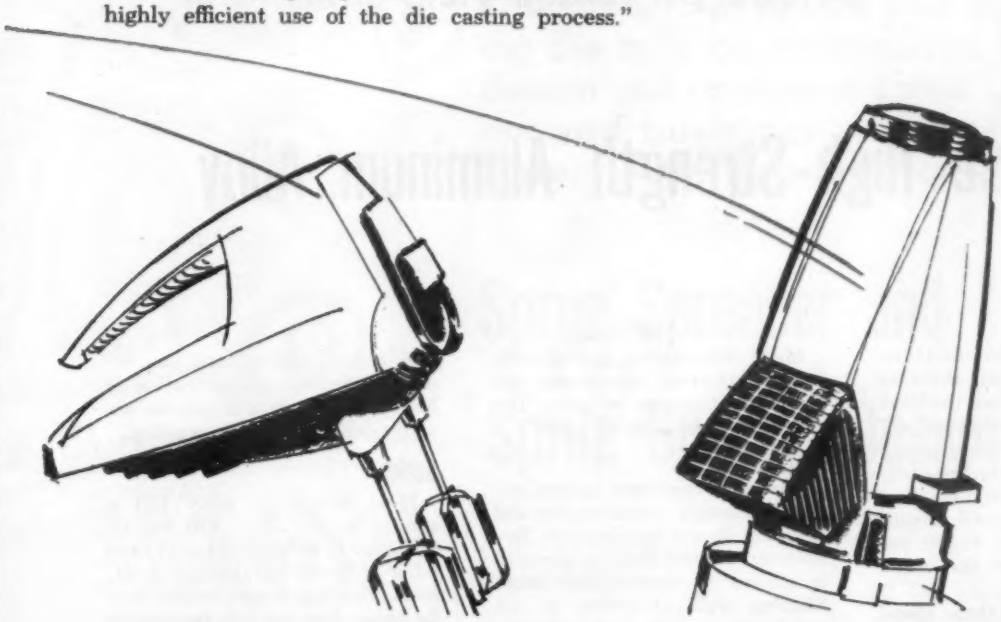
Without the die cast sole plate a product such as this one would be economically impossible. By providing all necessary mounting and fastening appurtenances as integral parts of a single casting and by providing a surface that needs only minor buffing and polishing to finish it; a highly efficient, compact, low cost appliance can be produced.

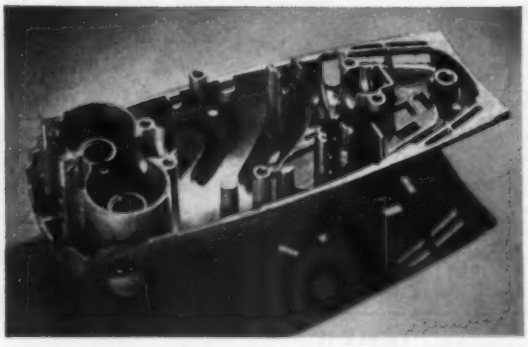
THE two principal structural parts of the standard Blendor — the base and the jar holder — are zinc die castings. The only metal removing operations that are required on the castings are tapping of the holes in the assembly bosses and punching a hole in the side wall of the base to accommodate the operating switch lever. These castings are made with a "hardware finish" so that surface finishing — either chromium plating or baked enamel — can be done with a minimum of preparatory work.

Another model, a commercial Blendor, not illustrated here, also makes use of a number of zinc die castings. While both appearance and cost were primary items of consideration, other advantages include durability and adequate weight for the service.

the Waring Line!

"ONE of the principal reasons for the spectacular success of the Waring line is the comparative simplicity with which the appliances are designed and manufactured. Much credit for this studied simplicity can be attributed to a highly efficient use of the die casting process."





RATHER than try and adapt a standard kitchen mixer to portable services, this unit was specifically designed to be portable. Here proper weight distribution is vital to efficient performance and to elimination of wrist fatigue. The ultimate design dictated an aluminum die cast bottom housing. This casting is shown from the underside to reveal its complex structure.

No other method of production would permit such complexity without exorbitant machining. The aluminum die casting is made ready for assembly by reaming the two bearing holes for the beater shafts, cross drilling holes in the two upright posts and milling these projections for assembly clearance. The casting is given a baked enamel finish.

THE Ice Jet attachment is used in place of the mixing jar on the standard Blendor. The top housing of the ice crusher is an aluminum die casting and the bottom housing a zinc die casting. With this combination of metals a proper balance of weight for efficient operation of the device could be achieved.

As in all other appliances in this line the design of the die cast components was carefully studied to assure the most complete use of this method of fabrication. As a result, machining is again reduced to a minimum, in this case two holes in the aluminum top housing are tapped and one bearing hole in the bottom housing reamed. As in most of the other units in this line, surface finish is baked white enamel, though plating can be done when desired.

You can get 46,000 psi ultimate tensile strength and 36,000 psi tensile yield strength in . . .

A Castable High-Strength Aluminum Alloy

THERE is an intermediate strength range in airframe components that can not be filled by presently available casting alloys and for which heavy press forgings are stronger than needed. To fill this gap, a castable alloy is needed with an ultimate tensile strength in excess of 40,000 psi and a tensile yield in the order of 30,000 psi.

An alloy which fills these specifications amply has been developed by North American Aviation, Inc. A member of the magnesium silicide family of aluminum alloys, modified with beryllium and sodium, the new structural material promises to decrease the load on the heavy press forging facilities of the country and help to break a serious bottle-neck in the construction of airframes.

The new alloy, known as 42B, has general mechanical and physical properties as given in Tables I and II. Composition-wise, the new material is very similar to alloy 356 with added beryllium to gain strength and to minimize the effect of iron impurities that are always present. Shrinkage factors are not yet completely determined, but on sand and permanent mold castings made with patterns designed for 356 alloy, it appears that shrinkage is the same or nearly the same for the two alloys.

Availability of the alloy is excellent, several smelters are now pouring ingot according to specification and a number of foundries are casting 42B.

Much information has already been gathered concerning the casting of the new material. The data available thus far are:

Melting

Normal precautions against excessive melting temperatures and agitation should be observed. Resistance to dross and gas porosity is similar to that of 356 alloy. Fluxing with chlorine is not necessary and is not recommended unless followed by sodium modification. Gates, risers, and scrap castings may be remelted. Serious contamination or loss of elements will not be encountered in normal practice.

Gating

Mold design for alloy 42B is similar to 356 alloy. 42B has no tendency to be hot short or to have other difficult shrinkage problems. Pouring temperatures may be lower than for 356, because of the exceptional fluidity of 42B.

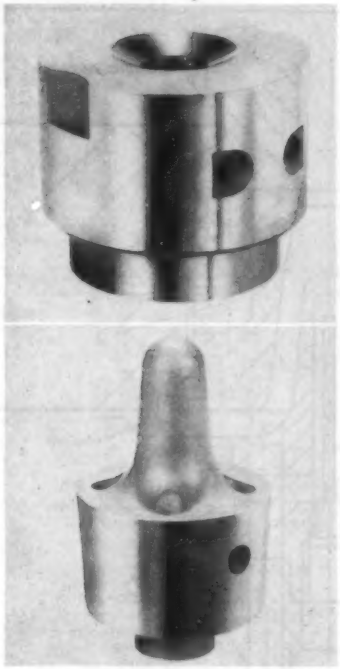
Continued on page 58

TABLE I
PHYSICAL PROPERTIES OF ALLOY 42B-T6

Density (Lb. Per Cubic Inch)	0.097
Coefficient of Thermal Expansion (Inch / Inch Per Degree F.)	
68-212°F.	11.9 x 10^{-6}
68-392°F.	12.7 x 10^{-6}
68-572°F.	13.0 x 10^{-6}
Electrical Conductivity (Percent of Int. Annealed Copper Std.)	39
Thermal Conductivity (at 25°C, C. G. S. Units)	0.36
Specific Heat (Cal. Per Gram at 212°F.)	0.23
Corrosion Resistance: Slightly superior to 356-T6 in a 48 hour salt spray test.	

TABLE II
MECHANICAL PROPERTIES OF ALLOY 42B-T6

	Sand Castings		Permanent Mold Castings	
	Typical	Suggested Design Minimum	Typical	Suggested Design Minimum
Ultimate Tensile Strength (PSI)	46,000	42,000	50,000	45,000
Tensile Yield Strength (0. 2% Offset - PSI)	36,000	32,000	44,000	38,000
Compressive Yield Strength (0. 2% Offset - PSI)	36,000	32,000	41,000	38,000
Ultimate Shear Strength (PSI)	41,000	35,000	44,000	38,000
Ultimate Bearing Strength (e/D = 2. 0 - PSI)	98,000	88,000	103,000	94,000
Bearing Yield Strength (e/D = 2. 0 - PSI)	62,000	56,000	73,000	67,000
Elongation (% in 2 Inch)	5.0	3.0	6.0	3.0



1. **PROPERLY DESIGNED** sprue bushings and spreaders such as these give the longest life and the least maintenance problems. For these parts, standard stock units are preferable to machining the bushing into the die block.

The success or failure of a die casting die may be determined by the design and cooling of sprue spreaders and bushings. Here is some current American practice

Sprue Spreader and Sprue Bushing Design

By FOLKE HALWARD
Detroit Mold Engineering Co.

TODAY'S increased demand for faster cycling of die cast machines has directed more attention to the problems of quick cooling of the castings as well as the sprues and gates. The sprue, generally being bulkier than other parts of the shot, often forms the bottleneck for faster operation and is therefore an important factor to consider.

To properly evaluate the effectiveness of sprue cooling, one must consider the sprue spreader and sprue bushing as a unit in order to attain an unrestricted flow of the metal, and at the same time effect the most efficient cooling. For an unrestricted flow of the metal, the contour of the sprue spreader should be so designed as to allow a uniform flow passage in the sprue bushing hole, leaving the desired wall-to-wall thickness for flow capacity, (See A in Fig. 2).

The wall-to-wall space will vary to a slight degree by seating the sprue spreader at various depths for a desired gate thickness. In making sprue bushings and sprue spreaders as standard products, to keep them on hand for replacement, it is well to design them to allow for an average gate thickness of 5/16". Thus a decrease or increase of the gate thickness when installing the spreader will not appreciably alter the wall-to-wall distance to the extent of affecting the casting and cooling operation. It follows that if a 3/16" thick gate is used, a decrease of wall-to-wall distance will coincide with the lesser demand on the metal flow.

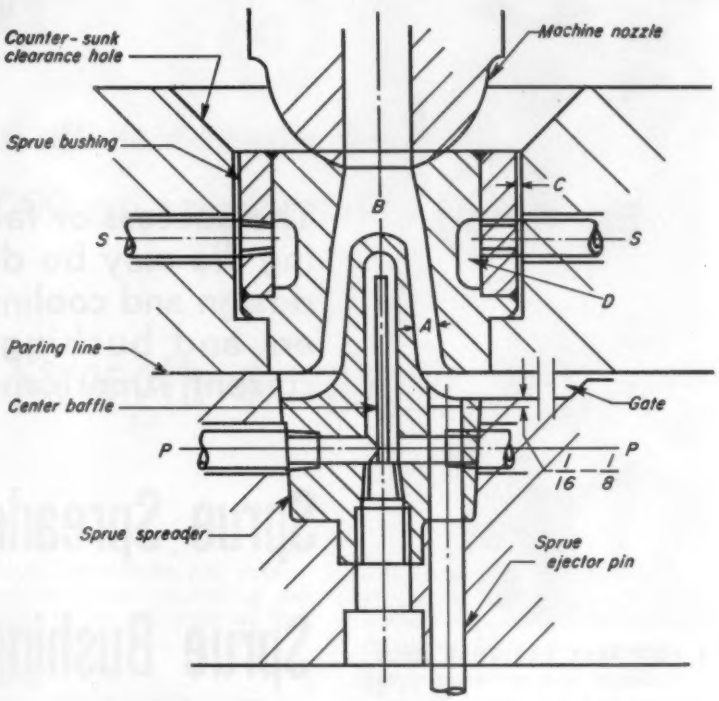
The hottest part of the sprue and the part to solidify last is the portion between the tip of the sprue spreader and the orifice of the machine nozzle, indicated by Letter B in Fig 2. The solidification time at this point is, therefore, the determining factor in the sprue that controls the cycle time.

In the early days of die casting it was common practice to machine the sprue hole in the solid die block and then surround it with water line holes drilled from four sides. This method cooled the hole area to some extent, especially at the four points around the sprue hole nearest to the waterlines. It is obvious that such a cooling method will not meet production requirements.

The most efficient and accurately controlled sprue cooling is achieved by using the inserted, self-contained, water-cooled sprue bushing, as shown in Fig. 2. In this type of sprue bushing a uniform water jacket, Letter D, completely surrounds the sprue hole at the critical location (See Sect. S-S of Fig. 2). This method also insulates the sprue bushing

Good Sprue Design Should Include These Features:

1. Allow an average of 5/16" gate thickness.
2. A uniform water jacket should surround the sprue hole.
3. The sprue bushing should be assembled by welding, brazing or other high temperature joining method.
4. The sprue hole should be nitrided.
5. The sprue bushing should be polished periodically.
6. Counter-sink the clearance hole in the die to permit the use of a standard sprue bushing.
7. Use only the best grade of thermal shock resistant steel.
8. Nitride the spreader after machining and before final grinding and polishing.
9. Use a center hole water line when ever possible.



2. SELF CONTAINED, water cooled sprue bushing and sprue spreader inserted in a die block. Units of this type give the best performance.

from the cavity block by a minute air gap between the two units by virtue of a slip fit size, Letter C in Fig. 2. Only the cavity side of the sprue bushing, with a smaller diameter, has a tighter fit to prevent metal flashing and sticking at the joint. The inserted type sprue bushing permits independent cooling of the cavity block in the vicinity where controlled cooling of cavities is necessary.

Two methods of installing cooling lines to the water jacket of the sprue bushing are illustrated in Sect. S-S from Fig. 2. Method A-A shows two pipes entering the water jacket from the same side, with a baffle located between the in and out holes, establishing complete circulation. The second method (B-B) shows opposing in and out holes and is used without a baffle.

Most failures of sprue bushings result from leaking assemblies. Due to repeated heating and cooling of the sprue bushing, with subsequent expansion and contraction of the assembly and its component parts, it is important to have a firm water-tight joint by welding or high temperature brazing. To test for leaks it is recommended that 200 p.s.i. hydraulic pressure be used before installing the sprue bushing in the die.

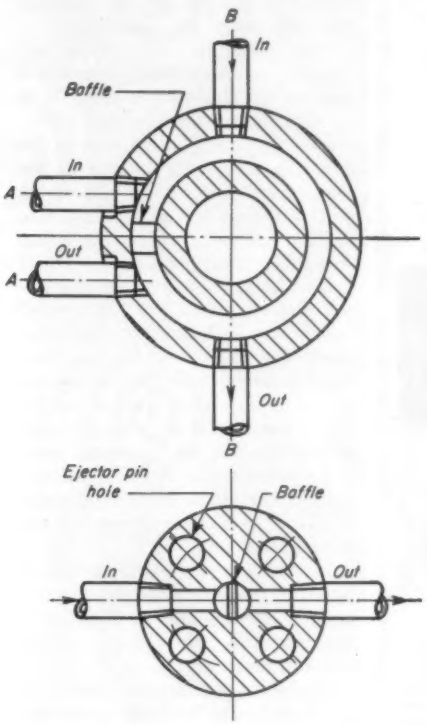
In time any sprue bushing will "wash", erode and heat check in the sprue hole from the shock of the injected molten metal. The heat checking tends to form a network of fine cracks in the hole. These cracks must be polished out periodically when becoming coarse enough to cause the sprue to stick. Polishing is only a temporary corrective measure, however, since once the cracking has started its action it will continue by further subjection to the hot metal flow.

After extended study and testing, it has been found that a nitrided sprue hole provides a hard, heat-resistant surface that is most suitable for die cast applications. By using a steel of sorbitic structure, a satisfactory case depth results for even better protection. The nitrided hard surface also protects the spherical nozzle seat from scratching and other damage.

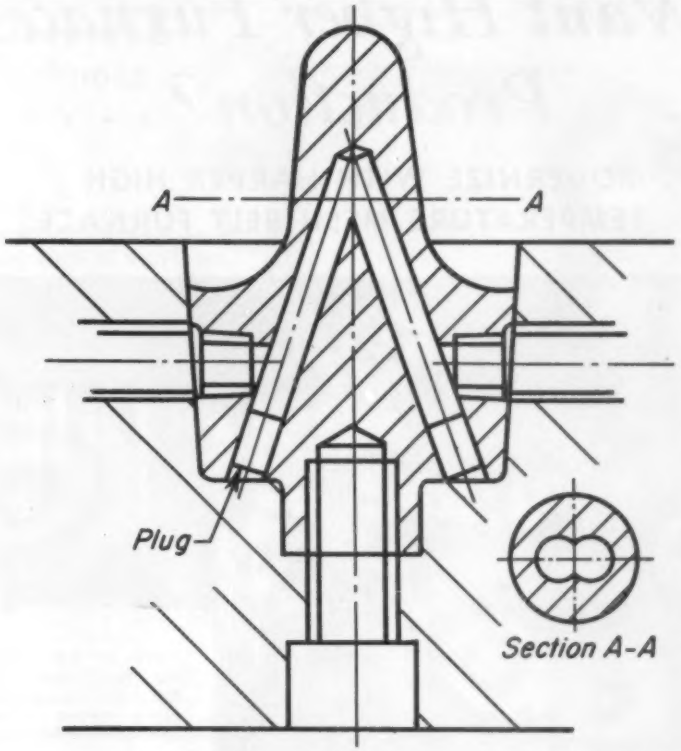
The most suitable length of the sprue bushing to be used has often been a controversial subject. To make this length the same as each particular die thickness would be impractical from the viewpoint of replacement. Since most die blocks vary in thickness it would require a large quantity of various sizes of sprue bushings to be on hand for immediate replacement.

One standard length sprue bushing can be used for most die thicknesses up to about 5" thick by counter-sinking a clearance hole in the die block for the machine nozzle. The advantage in economy is obvious. Not only from the standpoint of replacement, but by keeping the die cast sprue to a minimum length a reduction in dross loss is realized when remelting the sprue. This saving is worth considering for high production runs.

For die blocks thicker than 5" special sprue bushings and sprue spreaders are of course necessary and should be made with propor-



3. **SECTION S-S** (above) and P-P (below) of bushing and spreader in Figure 2.



4. **UNDESIRABLE COOLING** method for a sprue spreader. The single hole with a baffle is to be preferred.

tionally larger volume water jackets for cooling a greater volume of metal.

The sprue spreader takes by far the toughest treatment from the injected hot metal. This is especially true of the tip of the spreader where the impingement of the shot will severely erode most ordinary steels in a short time. This is also the point where the constant flow of the cooling water further contributes to a state of an unbalanced temperature condition, fluctuating in a small area. The tendency towards cracking is severe. Only the best thermal shock resistant steel offers a reasonable life expectancy. The steel used must also have a high tensile strength without being brittle under the prevailing temperature conditions. Due to carelessness, die cast dies are sometimes closed with a solidified drooling slug of the die cast metal left in the sprue hole, with the possible result of bending or breaking the sprue spreader.

Sprue spreaders of today are made from an air hardening steel of 5% chrome, .35 carbon, and 1½% molybdenum content. The steel is further heat treated for sorbitic structure to promote a satisfactory nitrided case. Here again, the nitrided case with its inherent heat resisting quality adds appreciably to the useful life of sprue spreader. When tested, a nitrided case retains the same hardness at 750 F as at room temperature. It also withstands prolonged heating at 1000 F without softening of the case.

When constructing the sprue spreader it is advisable to complete all machining operations, except grinding, before nitriding due to the extreme hardness of the case. The threaded pipe holes should be plugged before heat-treatment to avoid causing brittle threads. The ejector pin holes should be left open to gain the benefit of a nitrided bearing surface for the pins.

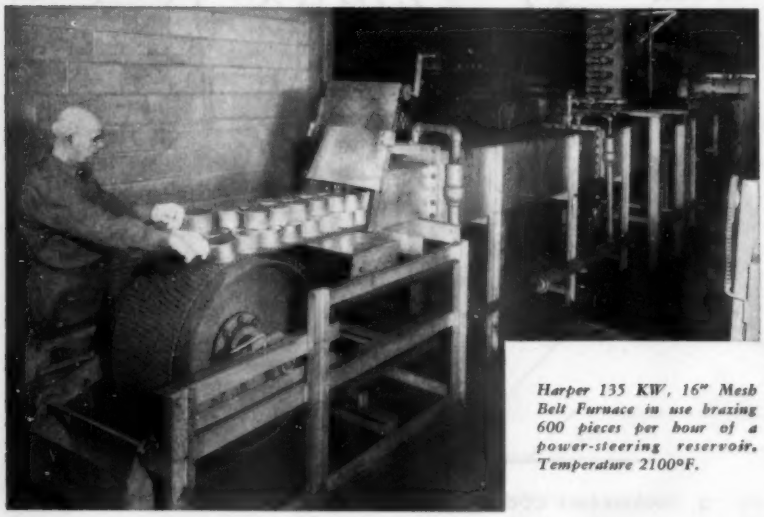
For the purpose of uniform cooling of the spreader, a center hole water line is preferable, as shown in Fig. 2. This method provides a more nearly uniform cross-section at any point along the sprue to be cooled. Other methods such as the two drilled angle holes shown in Fig. 4, will result in a non-uniform cross-section. Any sizable variation in mass at any one cross-section will promote cracking by uneven expansion and contraction. By the same token, a ball nose drill should be used for final finishing of the bottom of the center hole to conform to the outside radius of the tip. While such details may seem trival, they will prove rewarding in actual operation.

To circulate the coolant through the tip of the sprue spreader, a copper baffle or an inserted copper tube are equally good. If a baffle is used, it must be secured to prevent rotation or change in position and the hole should be sealed off with a ⅛" pipe plug. The in and out holes of the sprue spreader are located at a level well below the shoulder to allow a safe distance between the pipe holes and any gates or overflow pockets cut in the die.

Continued on next page

Want Higher Furnace Production? . . . .

MODERNIZE WITH HARPER HIGH TEMPERATURE MESH BELT FURNACES



Harper 135 KW, 16" Mesh Belt Furnace in use brazing 600 pieces per hour of a power-steering reservoir. Temperature 2100°F.

If you need up to 50% greater continuous furnace capacity without increasing space; and if your operating temperature range is 1800°-2100°F, a modern Harper Mesh Belt Furnace may well be the answer to your requirements.

These compact continuous furnaces are designed to utilize fully the advantages of silicon carbide heating elements* and today's high temperature oxidation-resisting alloy mesh belts.

Silicon carbide resistance heating elements allow high concentration of heat in a small space, thereby providing considerably greater production than furnaces of similar size using ordinary nickel alloy elements. Silicon carbide elements are also replaceable without complete furnace shutdown.

Two more important advantages of Harper Mesh Belt Furnaces are:

1. MULTIPLE-ZONE HEAT CONTROL — Heating elements are connected in several individually-powered and controlled zones for maximum flexibility of the heating curve.
2. PRODUCT UNIFORMITY — Furnace design based on many years of experience plus properly applied control instrumentation means uniform product day after day.

There are many more plus values. These economical furnaces are designed for operation with all types of standard atmospheres. An automatic non-loading belt take-up mechanism adjusts belt tension without reducing useful belt loading. A small water-cooling chamber next to the hot zone can be readily removed for maintenance or replacement due to rapid oxidation.

Harper Mesh Belt Furnaces are available with or without alloy muffles. Matching preheat furnaces are also obtainable. For full information write for Bulletin 454 to Harper Electric Furnace Corporation, 41 River Street, Buffalo 2, New York.

*Nickel alloy elements available for lower temperature applications.

. . . Visit Booth No. 224 at the Western Metal Exposition . . .

HARPER ELECTRIC FURNACES

For Continuous Brazing, Sintering, Wire Annealing, Bright Annealing, Annealing, Forging and Research

For more information circle No. 42 on the Reader Service Card

The sprue spreader can be made either with a straight or a slightly tapered body for seating.

The straight body type requires an accurately machined pocket for obtaining a snug fit. It is also somewhat harder to remove after long usage due to the peening of the die surface at the seam from flashing die cast metal.

There are a few general rules to follow that will protect the sprue assembly and improve their length of service. The sprue ejector pins should be left 1/16" to ⅛" below the surface of the spreader (see Fig. 2) thus casting four lugs to serve as an anchor for the sprue to the ejector half of the die. This practice also prevents any difficulties caused by metal sealing around the ends of the ejector pins if the holes become slightly bell-mouthed after extended use in the die.

Never turn on a full stream of water if the unit is hot from running without water or from preheating the die... this could cause quench cracks. If the sprue spreader becomes over heated, it is advisable to first use a stream of air, instead of water, until it is cooled to normal temperature for water cooling. Keep a trickle of water running through while preheating the die or for any short stoppage of operation of the die.

DESIGN ENGINEERING SHOW TO BE HELD IN NEW YORK

The 1957 Design Engineering Show, scheduled for the New York Coliseum May 20 to 23, is expected to draw a record attendance from all over the United States and Canada.

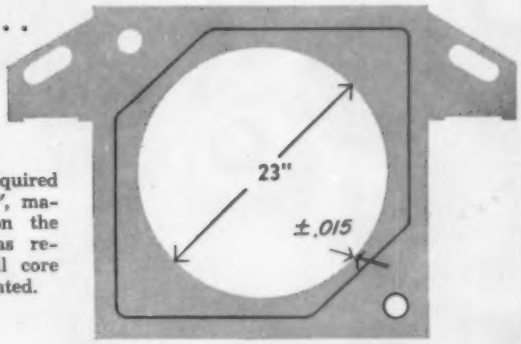
The basic theme of this year's show will be the proper selection of materials and fabricating methods to give the best possible design for any given component. Stress will be placed on designing for the original equipment market.

In addition to the show there will be, as in previous years, a series of conference sessions devoted to both materials and their fabrication as well as proper design considerations for the different materials discussed.

At the show will be hundreds of product demonstrations covering a wide range of materials, components, parts, fasteners, finishes, etc.

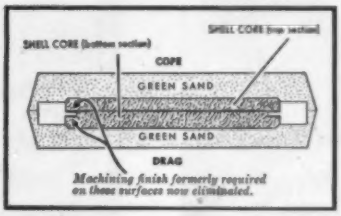
About 350 manufacturers are expected to have displays.

Close web thickness . . .



TO MAINTAIN the required tolerance of 0.015", machining tolerance on the web thickness was required. With a shell core machining is eliminated.

. . . was met with this shell core



THE SHELL MOLDED core in a green sand mold gives a sufficiently high degree of precision so that subsequent machining is no longer needed on these large castings.

Machining stock almost eliminated with - - -

A Shell Core In A Sand Mold

TWO-PART resin-bonded shell core is used to cast the inside web of filter press plates to required dimensions. The top section of the core is flat, the bottom section has a raised face.

HOLDING close tolerances on stainless castings with small shell cores is no unusual feat in foundry operations today. However, the technique need not be limited to small shell cores, as Cooper Alloy Corporation, Hillside, N. J. recently demonstrated when it produced a run of 26" x 26" castings in which interior surfaces of 23" x 23" were held to tolerances of ±.015 with the use of special cores, one of the largest yet known in the stainless casting field. With the need for surface machining eliminated, cost to the customer was cut considerably from that previously paid for similar castings made by the old sand mold methods.

The castings in question are 18-8 stainless steel plates for plate and frame filter presses. The customer, Tennessee Eastman Co., Kingsport, Tennessee, Division of Eastman Kodak Company, makes the presses for use in the manufacture of synthetic fibers.

Previously, these plates had been sand cast and subsequently machined to achieve the desired tolerances on the inner surfaces. Since cost per part was such an important factor in a quantity run, the specifications stated that the critical inner surfaces had to be cast to size. Tennessee Eastman submitted the problem to Cooper.

After initial investigations, it was decided that the plates had to

SHELL CORES in place in a mold ready to be closed prior to casting.

THE TOP SECTION of the two-part resin-bonded core being removed from the molding machine.

STRAIGHTENING the cores by means of a spring loaded press. The cores are put in the press while warm.

be sand cast to hold costs in line. But only resin-bonded shell cores could possibly achieve the required tolerances. Previously, small shell cores had been used to hold close tolerances in the casting of stainless steel parts, but never before on such large flat pieces.

The casting of a large cored plate roughly 26″ x 26″ with irregular projections and scarcely more than ½″ thick at its maximum dimension presented new problems. Within the surface of the plate was a web roughly 5/16″ thick and, because of the plate's design features, varying in area from several square inches at two opposing corners to relatively narrow dimensions elsewhere.

Formerly the plate was produced from a green sand mold with the web cast to tolerances of +1/32. Subsequently it had to be machined to exact tolerances since these could not be held without the use of a core. This operation was time-consuming and costly.

After studying the problem, the foundry's engineers developed a two-piece, smooth, resin-bonded core which could be so accurately located within the sand mold that it permitted the casting of the thin internal web to a ±.015 tolerance with no machining required.

To form a smooth, non-grainy web, the surfaces of which had to be exactly equidistant from the centerline in order to accommodate the filter medium, the resin-bonded core was made in two parts.

Initial experiments showed that because of its size and shape, the core had a tendency to warp at the edges. This warpage was prevented by means of a press developed at Cooper Alloy for shell closing. It consists of a series of springs which clamp on the core at various locations, pressing it against a flat surface for several minutes until the core has cooled.

The cores are made by conventional shell molding techniques. The pattern plate is mounted in a molding machine, pre-heated to 500 F. and maintained at this temperature. A hopper below the machine is filled with the sand-resin mix and as the pattern is rotated, the dump box comes up and locks in position.

The unit is rolled over, pouring the mix on the pattern and then rolled back, returning excess material to the box. The pattern containing the soft shell returns to its original position and an oven slides over it to cure the sand. The oven then retracts and the core is removed from the machine.

Production of these shell cores combined with their intelligent use in sand casting has considerably lowered the cost of finished parts. The operation has enabled critical tolerances to be held where necessary, thus saving thousands of dollars in finished piece costs.

PRODUCERS BECOME INVESTMENT X LICENSEES

Two producers of lost wax precision castings have now become licensees of the advanced new Investment X Process, a lost wax shell mold technique, it was announced by Shaw Process Development Corp., Port Washington, N. Y. The two companies are Hitchiner Manufacturing Co. of Milford, New Hampshire, and Arwood Company of New York, N.Y.... both of which are also licensees of the Shaw Process. This process greatly extends the weight and size limitations on precision castings.

ALUMINUM ASSOCIATION ELECTS OFFICERS

S. D. Den Uyl, President of Bohn Aluminum & Brass Corporation, Detroit, was elected President of The Aluminum Association at the annual meeting held here this week.

Arthur V. Davis, Chairman of the Board of the Aluminum Company of America, Miami, Fla., was elected Honorary Chairman of the Board. Everett G. Fahlman, President of The Permold Company, Medina, Ohio, who served as President of The Association for the past two years, was elected Chairman of the Board. George A. Ginsburg, Secretary, United Smelting & Aluminum Co., Inc., New Haven, Conn.; David P. Reynolds, Vice President, Reynolds Metals Company, Louisville, Ky.; and Harry L. Smith, Jr., Vice President, Aluminum Company of America, Pittsburgh, Pa.; were re-elected directors-at-large, each to serve three-year terms.

Three Association Vice Presidents were elected: Russel B. Caples, President, Anaconda Aluminum Company, New York, N.Y.; W. E. Dunlap, President, Aluminum Extrusions, Inc., Charlotte, Mich.; and Frank R. Nichols, President, Nichols Wire & Aluminum Co., Davenport, Ia.

TINCHER CHANGES NAME

Imprex Div. is the new name adopted for Tincher Products Co. of Milwaukee, a division of Ideal Industries. The change was made to better describe the companys equipment and services—metallic and plastic sealants used in all processes of impregnation, according to T. W. Juday, Imprex manager.

Here's What Users Have to Say About MARVEL *Synclinal* FILTERS

SUMP TYPE (cutaway)

LINE TYPE (cutaway)

Catalogs containing complete data available on request

U. S. STEEL CO., Irvin Works Three-Stand Cold Reduction Mill — "Marvel Synclinal Filters are a part of the mill's main hydraulic system which operates Coil Cradle as well as other hydraulic machines".

JONES & LAUGHLIN STEEL CORP., Aliquippa Works — "Marvel Synclinal Filters proved their effectiveness when one of the motors on the hydrostatic pipe testers broke down. A brass fitting was chewed up and jagged pieces of brass were carried in the oil stream. Any small piece of brass could also have caused a great deal of damage to the expensive equipment. However, when the unit was inspected, it was found that all metal particles had been filtered out by the Marvel Synclinal Filters and no damage had been done to the equipment nor was there any loss in operating time. Two filters are installed on each circuit so that one can serve as a by-pass while the other is being cleaned. Although it takes only about fifteen minutes to clean the monel filter insert, even this short interruption in production could be costly in an operation of this size".

MANY OTHERS REPORTING SIMILAR RESULTS ARE NOW SPECIFYING MARVEL SYNCLINAL FILTERS ON ALL NEW HYDRAULIC EQUIPMENT — AND STANDARDIZING WITH MARVEL SYNCLINAL FILTERS ON ALL EXISTING EQUIPMENT

For Dependable Protection on All Hydraulic and Other Low Pressure Circulating Systems —Investigate MARVEL SYNCLINAL FILTERS

OVER 750
Original Equipment Manufacturers Install them as Standard Equipment!

They Meet J. I. C. Standards

FILTERS FOR ALL TYPES OF FIRE-RESISTANT HYDRAULIC FLUIDS

Marvel's most recent development is a filter for the efficient filtration of all types of fire-resistant hydraulic fluids.

WATER FILTERS

Both sump and line type filters have been adopted for use in all water filtering applications. No changes have been made in the basic, balanced synclinal design.

A SIZE FOR EVERY NEED

Available for sump or line installation in capacities from 5 to 100 G.P.M. Greater capacities may be attained by multiple installation (as described in catalog). Choice of Monel mesh sizes range from coarse 30 to fine 200.

IMMEDIATE DELIVERY!

As in the past, Marvel continues to offer Immediate Delivery!

MARVEL ENGINEERING COMPANY

7227 N. Hamlin Ave., Chicago 45, Ill.

Phone: JUniper 8-6023

Without obligation, please send me complete data on Marvel Synclinal Filters, as indicated

- ☐ Catalog #107—For Hydraulic Oils, Coolants, Lubricants
- ☐ Catalog #200—For Fire-resistant Hydraulic Fluids (Aqueous Base)
- ☐ Catalog #400—For Fire-resistant Hydraulic Fluids (Synthetic)
- ☐ Catalog #301—For Water

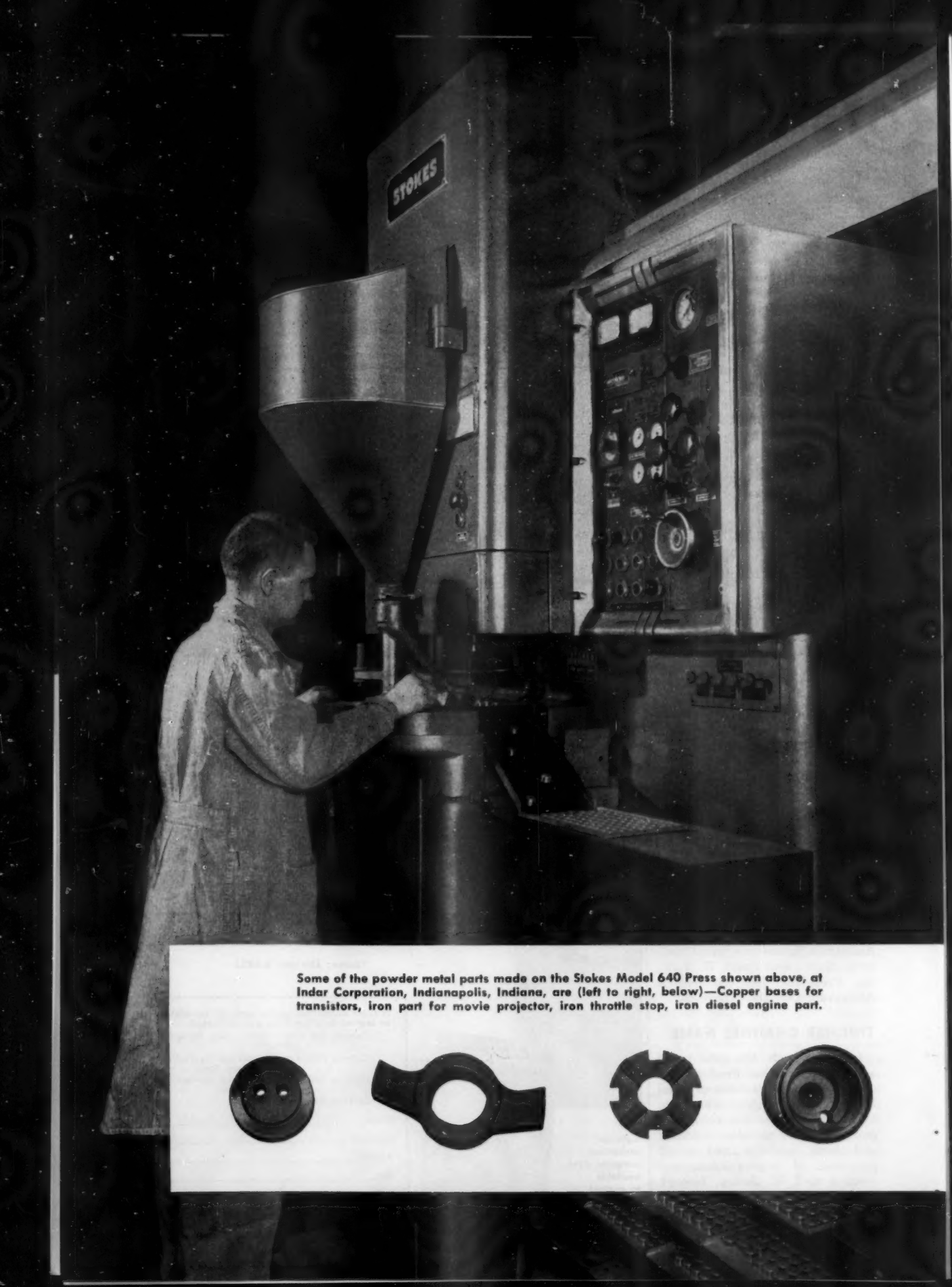
Name _____

Company _____

Address _____

City _____

State _____ PMM-3



Some of the powder metal parts made on the Stokes Model 640 Press shown above, at Indar Corporation, Indianapolis, Indiana, are (left to right, below)—Copper bases for transistors, iron part for movie projector, iron throttle stop, iron diesel engine part.

Indar Corporation makes complex parts economically

. . . on STOKES POWDER METAL PRESS

Custom producer of powder metal parts finds versatility of Stokes Model 640 broadens the range of parts production from copper transistor bases to iron diesel engine components

Scores of kinds of complex-shaped parts are being manufactured at low unit cost and to close tolerances, on Stokes powder metal presses at Indar Corporation, Indianapolis. This economical method of production eliminates much of the labor, machining costs and waste of metal involved in cutting from bar stock. It makes manufacturing highly automatic . . . highly precise.

According to Indar president E. I. Larsen, "The geometry of the parts we are making is such that the Stokes Model 640 Press, with its multiple motions, is ideally suited to their fabrication. The Model 640 extends very appreciably the range of parts that can be pressed."

The Model 640, latest in the extensive Stokes line, embodies features that have been developed during more than 35 years of leadership in powder metal pressing. Independent press adjustments and direct-reading calibrations make the 640 exceptionally easy to set up . . . and to control from one, centralized location. It is uniquely suited to tooling for close tolerance and multi-level work. Parts are protected against breakage because of full support during the critical breakaway and ejection phases of the pressing cycle.

The press is completely enclosed . . . streamlined in appearance, designed for maximum safety in operation. It can produce a wide variety of parts, in materials ranging from pure metal and alloy powders to mixtures of metals and non-metals. It is designed to run continuously with minimum maintenance.

If you are now making metal parts by conventional machining methods, it will pay you to have the Stokes Advisory Service prepare an estimate of production costs by powder metal pressing. Our complete service covers laboratory production for sampling, design and fabrication of punches and dies, full installation services and instruction of operators in your plant. Write today for a consultation by a Stokes representative . . . and ask for your copy of "Powder Metallurgy Today" and Catalog 815—"Stokes Powder Metal Presses."

Powder Metal Press Division
F. J. STOKES CORPORATION
5536 Tabor Road, Philadelphia 20, Pa.

STOKES

These leading producers profit from Stokes powder metal presses

$25,000 yearly saved . . . $30,000 machine tool outlay avoided . . . by making lock parts in a Stokes press at Dixon Sintaloy, Inc., Stamford, Conn.

$20,000 per year cost-reduction was made on a wringer drive gear of iron and copper powder, for use on "Whirlpool" washers. Parts made by the Presmet Corporation, of Worcester, Mass. . . . on Stokes powder metal presses.

82% drop in cost is the story behind this drive gear for a home ice cream freezer . . . formed in a single operation on a Stokes press at Yale & Towne's metal products division, Franklin Park, Illinois.

For more information circle No. 74 on the Reader Service Card

CASTABLE ALLOY

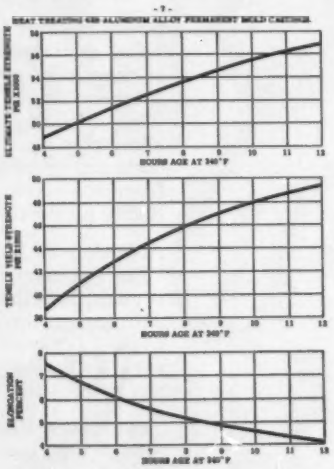
continued from page 48

The gating system, which produces the least agitation and allows the metal to solidify fastest, will give the best results in 42B, as in other casting alloys.

HEAT TREATMENT

The heat treatment of 42B is the simple solution treatment, quench, and artificially age type. There will be no difficulties if the procedures listed in NAA specification NA2-7152 are adhered to. As with other alloys, different properties may be obtained with 42B by varying the aging times and temperatures. The highest tensile and yield properties (and the lowest elongation) will be obtained by aging at 340 F (see Figure 1). The reverse is true at 310 F. In general permanent mold castings may be aged at 340 F, because of the better elongation caused by the permanent mold process. The best balance of properties in sand castings may be found at 330 F or 320 F. The highest aging temperature should be used which will produce the desired result in a minimum of three hours time.

Fully hardened the alloy is in the T6 condition. For investment castings a stabilizing treatment (temper T51) after casting may prove to be the most valuable since distortion during aging is thus avoided.



Mechanical properties of 42B.

Note: The following procedure was used to determine the above properties.

1. Solution heat treatment: 12 hours at 1010F.
2. 10 second interval between furnace opening and quench.
3. Temperature of quenching water: 140F.
4. Time between quench and age: 3 hours.

STRAIGHTENING

Castings of 42B will occasionally require straightening. This should be done only in the T4 condition, as soon as possible after quenching. Natural aging at room temperature proceeds so quickly that after about four hours the casting will be too hard to straighten.

In addition to high strength with good ductility, 42B has good corrosion resistance, dimensional stability, reliable response to heat treatment, and radiographic quality equal to the best commercial aluminum alloys.

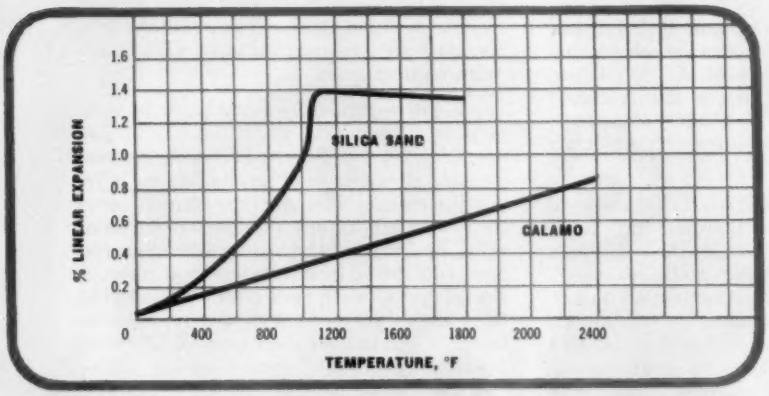
Cost of the alloy per pound is moderately high in comparison with most common alloys, due to the addition of beryllium.

HARBISON-WALKER

REFRACTORY

Mold Materials

for precision metal casting



CALAMO, one of the extensively used Harbison-Walker products for investment molding is an alumina-silica refractory of optimum sizings for various particular mixtures. Its fusion point is 100°F. higher than that of normal silica sand mixes.

The chart above shows the exceedingly desirable expansion curve of CALAMO as compared with that of silica sand. CALAMO used as the major constituent of investment mixes, improves the dimensional constancy of the molds and makes them stronger and more resistant to erosion.

With CALAMO, over-all investment costs are measurably reduced because an appreciably lesser amount of bonding agent is needed. This is attributable to the very desirable particle sizing and equiaxed, dense grains of CALAMO.

H-W MOLDSAND BOND is a highly refractory clay having unusual plasticity and bonding strength. Used alone or with other binders, it imparts enhanced hot strength to molds, and in some mixes replaces, wholly or in part, binders of higher cost. It is used with equally good results for rammed mixes with sand and Calamo. Molding mixes made with H-W MOLDSAND BOND have decidedly improved storage properties.

Write us for information regarding other Harbison-Walker products — mold wash materials — ceramic molding media — shell molding minerals.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Most Complete Refractories Service
GENERAL OFFICES PITTSBURGH 22, PENNSYLVANIA

For more information circle No. 96 on the Reader Service Card

THE PRODUCT

This modern checkwriting machine, the Todd Model 79 Protectograph, has been redesigned to take advantage of the economies of powder metallurgy.

THE TEAM

These men carried out the study into costs (left to right)

Standing

Richard E. Maxwell
Director,
Product Development Div.

Curtis W. Ingalls
Technical Control Manager,
Quality Control Div.

Rene R. Born
Chief Engineer, Machine Div.

G. Austin Fanning
Superintendent, Machine Div.

Seated

Paul J. Thut
Chief Product Engineer
Development Div.

Robert W. Beachner
Senior Project Engineer
Development Div.

They Teamed-Up To Cut Costs

IT takes more than an accountant with an adding machine to put through a cost reduction study on any product. Lower piece costs, while the prime objective, may not be achieved at the expense of product performance or manufacturing efficiency.

A six-man team was assigned by the Todd Company, Inc., to make a cost study of its Model 79 Protectograph check writer. The team, including representatives from design, development, manufacturing and quality control, also called in men from other departments as needed. Their procedure was simple and thorough . . .

Piece by piece they examined all major components of the machine, considering possible alternative manufacturing methods.

Outside vendors were then called in for suggestions concerning the practicality of these alternative methods.

Tentative changes in design detail and their effect upon the product were carefully studied.

Firm quotations were solicited from the vendors, including both piece price and tooling costs.

Materials evaluation was carried out by extensive laboratory and service testing of new materials.

Recommendations from the vendors concerning design changes that might be desirable from a manufacturing or economy point of view were explored: If wider tolerances were indicated, would they affect the fit of mating parts? What about cumulative tolerances? Would heavier sections, wider bearing surfaces or some other such change be needed to compensate for differences in physical properties? How would changes in shape or dimension affect the suitability of existing production tools? How would assembly methods and materials be altered?

Where a new material seemed to offer potential savings, and appeared to be satisfactory from a manufacturing aspect, samples were produced in the new material and tested for performance. Todd's product development laboratory put each of these trial samples through its paces.

In evaluating powdered metal parts, for example, the company procured blanks pressed in the powder of the desired composition from an outside vendor. While parts machined from blanks have properties varying somewhat from those of pressed-to-shape production pieces, it was felt that a general indication of properties could be obtained this

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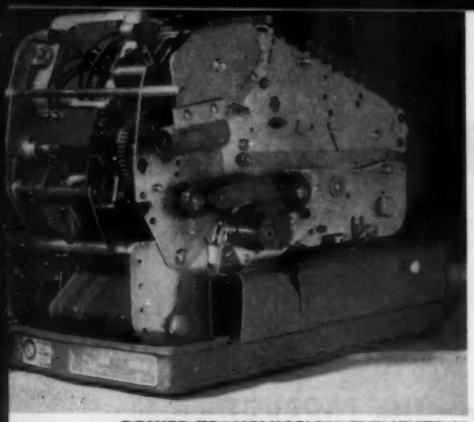


POWER TRANSMISSION ELEMENTS in this check writing machine, shown without its outer housing, include many powdered metal components. Segment gear, pinions, drive crank, link, etc. . . . all in powdered iron . . . can be seen in this view.

way. Any variation from true properties is likely to be on the low side, thus giving a reliable indication.

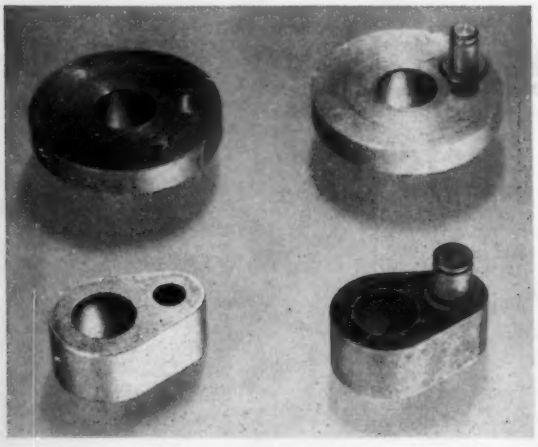
In some instances, a simple criterion was a comparison with cast iron—if cast iron was considered adequate for a particular component, then powdered iron was also rated as acceptable.

At the time of writing, nine powdered metal parts had been introduced into the Model 79 to replace parts which had, for many years, been manufactured by various machine shop methods of cutting, blanking, hobbing and assembling sheet or bar stock. Other components were then being tooled for production as powdered metal parts early in 1957 and several more were being studied for possible conversion.

Two vendors are producing the powdered metal parts illustrated here; they are Presmet Corp. and Amplex Division of Chrysler Corp. Both of these vendors have worked closely with Todd engineers during the development stages to work out problems in details, materials or costs.

Here are some of the cost-cutting powdered metal parts now being used by the Todd Co., Inc.

HERE ARE EIGHT MONEY SAVING POWDERED METAL APPLICATIONS



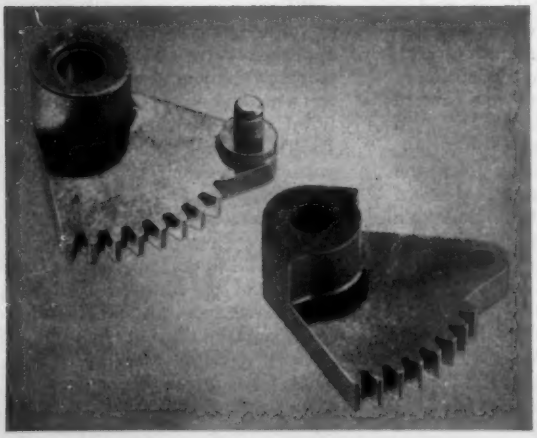
Cost Cutter No. 1 | DRIVE CRANK

OLD METHOD: The drive crank was originally turned on a screw machine from SAE 1113 steel. Hole for stud was drilled and the center hole was bored. The stud was pressed in, riveted and brazed.

NEW METHOD: The drive crank is pressed from iron powder. As pressed and sintered, the large hole diameter is held to .500/.501, the small hole .2505/.2515 and the center distance .550/.554 without machining. The stud is pressed in and brazed.

COMMENT: By changing the shape from the round dictated by the bar stock, to an oval, better use is made of the metal mass, whose function is simply to locate two holes accurately. Longer bearing surface for stud, and shorter distance to drill a cross hole are achieved by the change in shape made possible by powder metallurgy techniques.

SAVING: The screw machine crank cost $0.20 compared with $0.15 for the powdered iron crank.



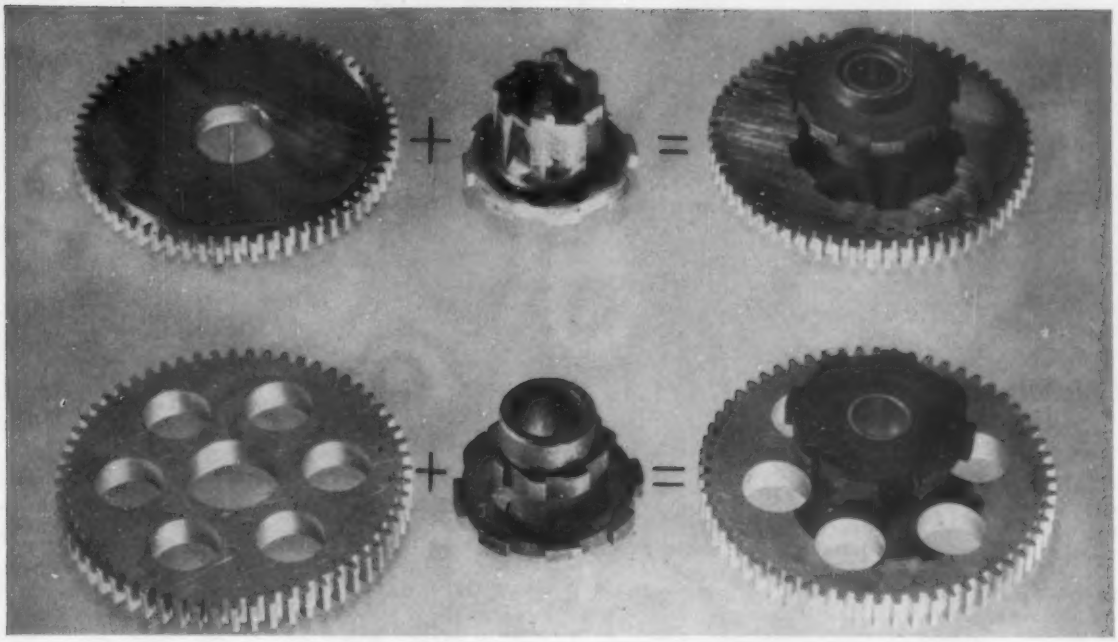
Cost Cutter No. 2 | SEGMENT GEAR

OLD METHOD: The segment gear was blanked from cold rolled steel, teeth were hobbed and two holes drilled. A stud was pressed into the smaller hole, the end riveted and ground flush. It was then brazed. A hollow post was brazed into position over the larger hole, a flanged bushing pressed in and brazed. Then, locating from the teeth, the bearing hole was bored and reamed for center location and size. Center was held to ±.001 and diameter to +.000 —.001 Teeth were hardened locally to Rockwell 50/55 with .010 to .012 case.

NEW METHOD: The segment gear is pressed from steel powder infiltrated with copper and needs only to have the post pressed in, brazed and machined for height. Separate bushing has been eliminated.

COMMENT: Some changes in design were made possible by powder metallurgy. Gear was made 1/16" thicker to give greater tooth surface, sufficient to resist shock loading. Part tested far beyond expected service life of the machine. Shape of the bearing post was changed to improve design of powder metal die. Pressure angle on the teeth was increased from 14½° to 20°.

SAVING: Old assembly cost $1.19, the powdered steel gear costs $0.33.



Cost Cutter No. 3 | CLUTCH RATCHET AND GEAR ASSEMBLY

OLD METHOD: The body of the ratchet was turned to size on a screw machine. Then, several milling cuts were taken. The clutch teeth and ratchet teeth were milled, and a cross cut on the end of the shank formed the two nibs subsequently used to drive the two-piece assembly. The clutch gear was blanked from 3/16" cold rolled steel. The center hole was reamed to .001 tolerance and then shaved to a special shape. Teeth were hobbed. The ratchet shank was pressed into the center of the gear and ring staked and corner staked. Center hole was bored to +.001 —.000, held concentric with pitch diameter of the teeth within +.000 —.001.

NEW METHOD: The ratchet is pressed from steel powder and infiltrated with copper. One blank is used for two different parts, getting the difference by means of a machined relief. The gear is pressed from powdered steel to exact size and dimension. The two parts are pressed together, a hole drilled and the two pieces keyed together by pressing in a pin. The ratchet and gear are brazed. The powdered metal parts must be oil-free to allow a good braze.

COMMENT: Face of the gear has been increased to ¼" and six holes have been introduced to lighten the piece and save metal. The ratchet teeth must be able to withstand severe shock loading and consequently they are hardened. Ratchet teeth are pressed to a close enough tolerance. Center hole is pressed to a total tolerance of .002.

SAVING: The original ratchet wheel machined from the solid cost $0.88 and the gear cost $0.44 for a total material cost of $1.36. Now, the powdered steel ratchet costs $0.55 and the gear $0.15, making a total material cost of $0.70.

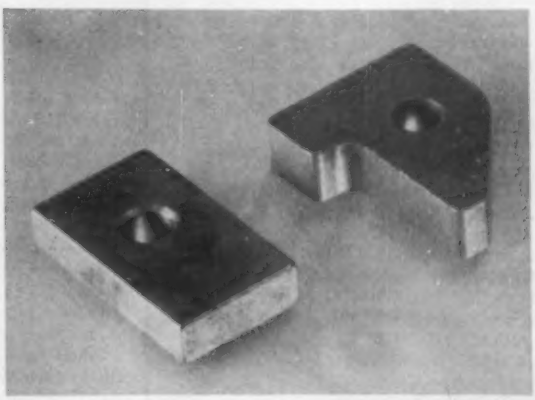
Cost Cutter No. 4 | PLATEN ELEVATING BLOCK

OLD METHOD: The block was cut from a ¼" bar stock to a size of ¼" x ¾", drilled and burred.

NEW METHOD: The block is pressed from powdered steel and oil impregnated.

COMMENT: Since the change to powdered metal removed the limitation on contour, the shape was changed from a simple rectangle to provide a longer top bearing surface. The side relief provides clearance for a tie rod. The piece is also made thicker now, which saves time and money in subsequent assembly by eliminating separate spacers that were formerly required. Oil impregnation gives a better bearing surface on which the top platen rides, resisting the slight abrasive action.

SAVING: The old block cost $0.12 and the new one $0.04.



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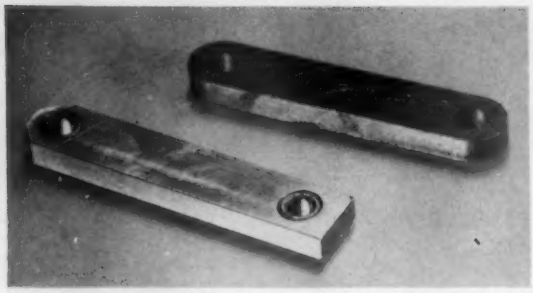
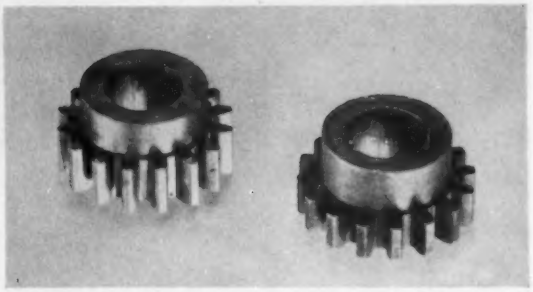


Cost Cutter No. 5 | DRIVE LINK

OLD METHOD: The link was cut from cold rolled steel bar, corners were milled from one end, two holes drilled, reamed and bored to +.000 —.001 on size and ±.002 on location. Powdered metal bearings were pressed in.
NEW METHOD: The link is pressed from powdered steel and oil impregnated.
COMMENT: Two separate bushings have been eliminated and yet the bearing properties are retained. Despite simplicity of the shape, substitution of one piece for three, including machining and assembling operations, has resulted in substantial saving.
SAVING: The old link cost $0.35 including two bushings and the detail part. The new one costs $0.11.

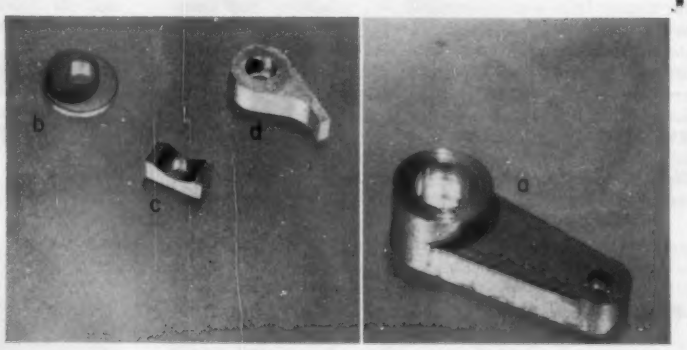


Cost Cutter No. 6 | MAIN SHAFT PINION

OLD METHOD: The pinion was turned from SAE 1320 steel on a screw machine, the teeth hobbed and the hole reamed and broached to .0005 tolerance. Teeth were locally hardened to Rockwell 50/55.
NEW METHOD: The pinion is pressed from steel powder and infiltrated with copper. The vendor presses the center hole to .498/.500 and finishes it to .5000/.5005.
COMMENT: Gear thickness has been increased by 1/16" and the greater tooth surface gives enough extra strength to eliminate the heat treating which had been a source of trouble due to distortion of the center hole.
SAVING: Cost of the pinion was reduced from $0.38 to $0.21.

Cost Cutter No. 7 | FULL STROKE DOG

OLD METHOD: The piece was blanked from ⅛" cold rolled steel, one hole was countersunk and the nose was milled. In blanking, .020/.030 stock was left for milling to get a sharp edge. The part was hardened. The post was pressed in and riveted flush into the countersink.
NEW METHOD: The piece is pressed from powdered steel and hardened to Rockwell C 45/55. Stud is knurled and pressed in. Riveting is not needed because greater bearing depth is provided in the hole.
COMMENT: The sharp edge on the nose that formerly had to be milled is now gained without an extra operation.
SAVING: The decrease from $0.08 to $0.06 piece cost is only part of the saving, the rest coming from simplified assembly.



NOW REACHING PRODUCTION are these new powdered metal parts which have been converted from machined pieces to get lower production costs. At the time of writing, these pieces were in final tooling stages and scheduled for production early in 1957. Obviously, no production cost comparisons are as yet available, although preliminary cost studies indicate substantial savings. The parts, and the metals in which they are pressed, are: (a) cylinder drive arm in powdered iron, measures .634 thick; (b) pull down eccentric in powdered iron, measures ⅝" in diameter; (c) oscillating block in powdered bronze is ½" wide, and (d) fountain actuator arm in powdered steel with zinc dichromate finish. A number of other parts now in early development stage are being studied carefully for possible redesign as powdered metal parts. These include a ratchet segment, four levers, a pinion, a drive dog, a feed roll turn knob and two supporting blocks.

A castable, corrosion resistant alloy comparable to 18-8 in stainless properties.

New - A High Strength Stainless Alloy

The well known 18-8 type of corrosion resistant steel, while showing excellent resistance to many highly reactive agents does not have the most desirable physical and mechanical properties for parts that are subject to high mechanical stresses, heavy wear, or applications where stress corrosion becomes an important consideration. Further, this alloy is essentially non-hardenable.

The search for a high-strength corrosion resistant alloy has led to the development of many interesting materials which, although exhibiting high strengths and hardnesses, are considerably inferior in corrosion resistance to the regular 18-8 stainless alloys. For example these newer alloys show corrosion rates of from 200 to 1000 mils per year in boiling 65 percent nitric acid, compared with the average rate of 10 mils per year for 18-8.

The pressing need for a castable alloy with as good, or better, corrosion resistance as 18-8 and superior physical and mechanical properties has led to the development of a new alloy, tentatively designated as CD-4MCu, with a composition range as shown in Table I.

This new alloy has excellent mechanical properties and corrosion resistance that is of the same order of magnitude as that exhibited by the older stainless material. The mechanical properties of this new alloy are shown in Table II. These data emphasize the excellent mechanical properties of the new alloy. Specifically, the elongation and reduction of area values reveal the high ductility, even at a hardness of approximately 300 Brinell. At this hardness the tensile strength and yield strength are far higher than the 18-8 alloys of comparable corrosion resistance which are characteristically not hardenable much

Continued on page 87

TABLE I
COMPOSITION RANGE FOR ALLOY CD-4MCu

Chromium	25.00% to 27.00%
Nickel	4.75 6.00
Molybdenum	1.75 2.25
Copper	2.75 3.25
Carbon	0.04 max.
Silicon	1.00 max.
Manganese	1.00 max.

TABLE II
PROPERTIES OF TWO PRODUCTION HEATS OF CD-4MCu

Heat No.	Heat Treatment deg F	Hours	Tensile Strength psi	Yield Strength psi	Elongation, %	Reduction of Area, %	Brinell Hardness	Charpy V Notch; ft - lb	Corrosion Rate[c] Mils per Year
R4431	850	4[a]	140,900	100,000	25.0	37.9	302	9.5	6.5
	850	1[a]	135,800	89,000	25.5	50.8	293	30.5	6
	1950	2,W.Q.	112,700	80,700	28.5	48.4	248	104.0	6
	None, as cast		121,000	83,500	27.0	41.4	262	18.5	18
P1	950	3[b]	140,000	120,000	16.0	....	321	....	6[d]
	2050	1,W.Q.	102,500	85,000	19.0	....	250	....	7[d]
	None, as cast		....	....	....	....	270	....	....

(a) Aging treatment preceded by water quenching after 2 hr at 1950 F.
(b) Aging treatment preceded by water quenching after 1 hr at 2050 F.
(c) In boiling 65% nitric acid. Average of five 48-hour periods; two specimens each.
(d) Average of two 48-hr periods; single specimens.

DATA OFFERED IN THIS MONTH'S ADS

the Reader Service Cards on the facing page will get you these free reference materials. Circle the numbers and mail.

Die Castings

41. **Small Die Castings**—A new bulletin from Gries Reproducer Corp. explains the company's unusual techniques and special facilities for producing tiny parts — finished, trimmed, ready for use — in one high-speed automatic operation.

46. **Die Casting with Zinc**—A pocket guide book on die casting the zinc base alloys has been prepared by Henning Bros. & Smith, Inc. This 31-page book contains a wealth of information for the die caster.

54. **Aluminum, Magnesium**—die castings, their production and advantages, are described in literature and design information available from Litemetal Dicast, Inc.

Investment Castings

44. **Investment Castings Design**—A brochure has been published by Hitchiner Mfg. Co. to aid the engineer in designing for the best and most economical use of investment castings.

Plaster Mold Castings

62. **Close Tolerances**—An illustrated brochure offered by Ohio Precision Castings explains the OPC method of maintaining close tolerances on intricate work.

Permanent Mold Castings

47. **"Behind the Scenes"**—is the title of a brochure describing Hampden Brass & Aluminum Co.'s experience, equipment, and facilities.

Powder Metal Parts

25. **Bronze Bearings**—Booklet S-56 from Chrysler Corp., Amplex Div. contains engineering data on more than 1,000 sleeve, flange, and thrust bearings carried in stock.

61. **Brass Powder**—Detailed information on the design, properties, production, and application of brass and other non-ferrous powder parts is contained in a manual offered by The New Jersey Zinc Co.

Metals and Alloys

21. **Precisely Controlled Alloys**—Vacuum or air melted alloys for casting, rolling, forging or extruding uses are discussed in a bulletin available from Cannon-Muskegon Corp.

Metal Powders

6. **Alloy Powders**—The use of alloy powders in the fabrication of parts, and the properties of these parts, are covered in detailed reports from Alloy Metal Powders, Inc.

40. **Better Stability**—is one of the advantages of "Resistox" metal powders described in detailed information from The Glidden Co.

70. **Iron Powders**—Complete information on all of Republic Steel's three new grades of iron powder is given in booklet Adv. 763. Included is a description of the powders' "CDF" feature.

Dies and Die Components

32. **Sprue Bushings, Spreaders**—Complete specification sheets giving all the uses and advantages of specially-designed sprue bushings and spreaders are available from Detroit Mold Engineering Co.

33. **Die Cavity Sets**—A 12-page brochure from Detroit Mold Engineering Co. gives complete prices and specifications on six new standard sizes of cavity sets for die casting.

71. **Die Cost Savings**—Data sheets available from Richards Tool & Mold Co. describe savings of up to 70 percent on zinc and aluminum die casting with the use of standard "Master Mold" cavity blocks.

Die Steels

5. **Tool Steel Handbook**—Another printing of the "Tool Steel Handbook" is available from Allegheny Ludlum Steel Corp. The 196-page publication completely describes the company's line of tool steels, and includes discussions of heat treating, handling techniques, weight tables, and other useful reference data. Requests should be made on company letterhead.

55. **Prehardened Die Steel**—Complete information and stock sizes are available on "Viscount 44," the new prehardened die casting die steel developed by Latrobe Steel Co. It can be machined in its prehardened state and needs no heat treating.

Die Casting Machines

8. **Low Cost, High Speed**—die casting machines are described and all specifications given in a folder from the American Die Casting Machinery Co.

12. **1,000 Shots per Hour**—according to Bulletin A-10, an engineering report on small die casting machines from ABC Die Casting Machine Co.

13. **13 Models**—of die casting machines are described in bulletins from B & T Machinery Co. Machines range in capacity from 100 to 750 tons—for zinc, aluminum, and brass.

19. **"Diecasting Small Parts"**—is the title of a 24-page book published by British Industries Corp., explaining the entire process and the DCMT packaged die-casting shop.

22. **"Mighty Midget"**—A bulletin from Cast-Master, Inc. describes a new small-size die casting machine designed to produce castings up to 2½ pounds.

26. **Improved Die Casting**—Faster die casting production at lower cost is said to be possible in literature on the Model 40-N machine built by Cleveland Automatic Machine Co.

29. **Double Efficiency**—with several important design features of the "Wedgelock" die casting machines is described in a bulletin from Cuyahoga Industries, Inc.

Powder Metal Presses

15. **30-ton Press**—Specifications and complete details on a new 30-ton powder metal press are available from Hamilton Div., Baldwin-Lima-Hamilton.

Continued on page 77

Coated abrasives are rapidly becoming one of the most versatile tools of the metal working industry. Paralleling the growth of the coated abrasive industry has been the development of machines to use them. A few of the new machines that utilize coated abrasives are shown in this issue beginning on page 68.

PMM

FINISHING SECTION

DEVOTED TO THE SPECIALIZED PROBLEMS OF FINISHING DIE CASTINGS, INVESTMENT CASTINGS, PERMANENT MOLD CASTINGS, PLASTER MOLD CASTINGS, PLASTER MOLD CASTINGS, POWDER METAL PARTS AND SHELL MOLD CASTINGS

The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.

In this issue

67 Why not use hot spray painting?

68 Production machines for coated abrasives

74 A completely automatic finishing department

here's how Seeburg matches P-K® fasteners to the job

And Parker-Kalon's wide range of types and sizes makes it possible

"By carefully selecting the right P-K screw for each assembly we've reduced rejects and stepped-up production," says Joseph Kamys, engineer of J. P. Seeburg, manufacturers of the famous line of Select-O-Matic "200" Coin Operated Phonographs.

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◂ "In this important subassembly, appearance is important as well as dependable holding power. Here we use P-K Type-A Phillips Recessed Head Screws in a metal-to-metal application."

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- ☐ Shell Mold Castings
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5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
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9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
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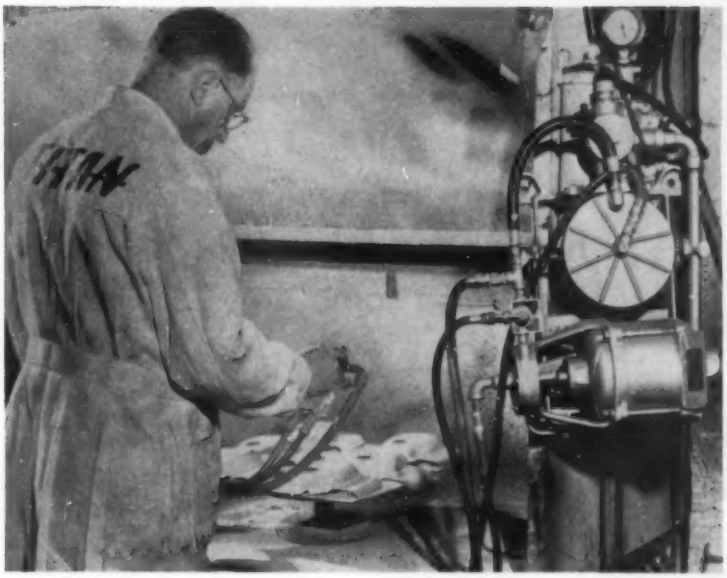


To lower material costs and increase production rates

Why Not Use Hot Spray Painting?

FOR the most economical application of a lacquer or enamel finish the finishing material must be applied as rapidly as possible to get the desired film thickness. Along with this must be a minimum of overspray to avoid waste of materials. If, however, in the normal spray painting methods a heavy deposit is laid-on in a single application, runs and tears will invariably result. Further, during the drying and baking cycle there is considerable probability that blistering will occur due to the formation of an impervious skin before all of the solvent has evaporated from below the surface. Another danger is the formation of blush if the "climate" in the paint spray department is not carefully controlled.

Practically all of these troubles can be avoided through the use of hot spray methods of paint application. Normally, the viscosity of the paint is controlled by additions of thinner. Not only is this method expensive from the use of materials, but it is unsatisfactory unless the spray department is carefully air-conditioned. Further, viscosity control through the use of thinner must give a paint with a low solids content so that at least two coats are required if a satisfactory finish is to result.

By heating the paint, however, a relatively wide temperature range from 150°F to 170°F is available where there is substantially no change in viscosity. In this same temperature range the paint will have about the same viscosity as that achieved through the use of large quantities of thinner. This means that when such a paint is sprayed it has, initially, a much higher solids content. A further advantage comes in the flash evaporation of much of the thinner while the paint travels from the gun to the work.

The net result is the deposition of a heavy layer, at least the equivalent of two layers applied cold, in a single spray application. The danger of blush is eliminated, there a few or no tears and runs, blistering can not occur since the more volatile thinner components have already evaporated. Drying time and baking time are materially reduced and the thinner normally lost by evaporation is saved.

All of these considerations led the Titan Chain Co., Inc. of Seattle, Ore. to install a complete hot-spray painting department. The equipment chosen was built by The Spee-Flo Co. to handle the particular types of lacquers that were used on the magnesium castings on the light weight portable chain saw made by Titan.

The use of hot-spray finishing has resulted in a distinct improvement in the quality of the finish secured and at least a 50 percent increase in the finishing department production. A bonus is the reduced fire hazard.

To keep pace with modern high speed fabrication methods, these are some new . . .

Production Machines For Coated Abrasives

COATED abrasives, and the machines that use them, have become the work horses of the metal working industry. Where-ever metal must be removed, from relatively heavy cutting such as cutting down welds and removal of heavy flash to fine polishing, there is an appropriate coated abrasive and a machine to do the particular job most easily and economically.

Some of the mechanical equipment for using coated abrasives are simple hand-held tools that employ a flat disc of abrasive cloth backed up with either a rigid or a flexible pressure disc. Others use cylindrical sleeves mounted on expandable drums of varying hardness and flexibility. Still other machines use belts mounted in a variety of manners to do either special jobs or to be used as general purpose tools in the finishing shop. A few of the many new pieces of equipment for general purpose and special operation work are shown below.

The flap wheel, hundreds of wearable abrasive strips attached radially to a hub. This type of wheel is made in 6", 10" and 12" diameters and is designed to be driven at 1750 to 2000 rpm with either a portable tool or on a fixed spindle. Face width is 1" and any number of wheels can be mounted on a single shaft. Product of Merit Products, Inc.

A slotted rubber wheel that accepts coated abrasive sleeves. Centrifugal force causes the wheel to grip the sleeve. Made in diameters from ½" to 8" and in face widths from ¾" to 10". Operating speeds vary with wheel diameter from 1800 rpm for the largest wheel to 19,000 rpm for the smallest. Product of Chicago Rubber Co., Inc.

A contact, wheel belt grinder featuring an aluminum frame, mounting a compressed canvas contact wheel and idler. The machine uses a 2½ x 60 in. coated abrasive belt. The frame can be pivoted 360 deg. about the center-point of its length.

Contact Wheel .....7 in. diameter
Idler Wheel .....4 in. diameter
Belt Speed .....5000 to 7000 sfpm.
Spindle .....1 in. diameter
Motor .....1 HP minimum

The machine is recommended for flash and mold mark removal, contour blending on both ferrous and non-ferrous castings or, with adapters, surface grinding, wire brushing, tool sharpening, etc. Product of the B. & E. Mfg. Co., Inc.

An air inflated contact wheel designed to allow almost instantaneous variation of hardness and conformability. A standard hub accepts several interchangeable rubber drums, either smooth or serrated. Can be used with either abrasive sleeves or belts on either portable or fixed machines.

Drum diameter .....2¼ to 6 in.
Face widths .....2 to 3½ in.
Speeds .....2500 to 8000 rpm.

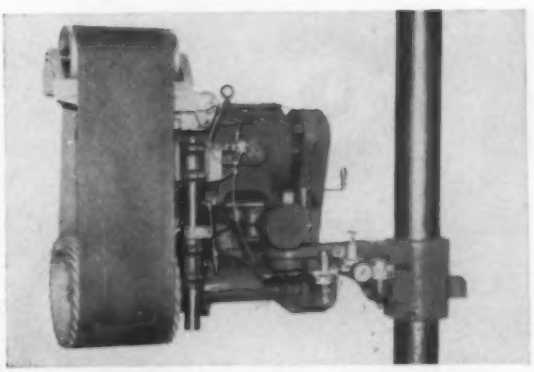
For use on single spindle machines or with back stand idlers. Recommended applications, work formerly done by setup wheel, finishing welds, removing gates, breaking corners and edges, sheet metal smoothing, etc. Product of Nu-Matic Grinders, Inc.

A belt grinding attachment for portable air or electric tools. Narrow profiles and any type of contour can be ground and finished. With the proper choice of abrasive, work from roughing down welds, parting lines, flash, etc. to fine finishing can be done.

On curved surfaces, the slack belt between the contact wheel and the idler pulley may be used to insure a fine finish. Products of the Buckeye Tools Corp.

A heavy duty radial arm belt machine designed specifically to handle 12 in. wide belts. Tracking is pneumatically controlled. The machine will handle narrower belts and can be modified to control belts more than 12 in. wide.

The machine is adaptable to use on straight line, rotary or return types of automatic finishing lines. Belt changing is easily done and tension, once properly set, is automatically maintained. Due to the variety of controlled movements possible with the radial arm support, the contact wheel and belt can be positioned to give the most desirable polishing angle. Product of the Acme Manufacturing Co.

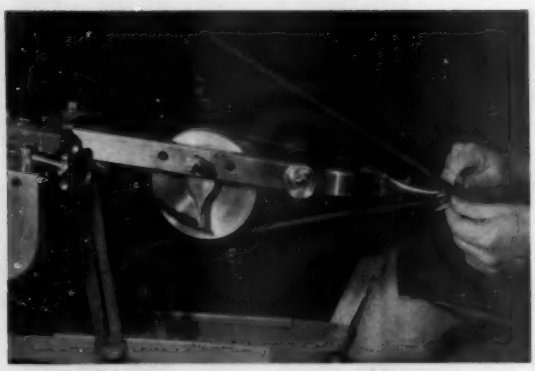


The extension arm is adjustable for vertical, horizontal, or angular positioning. The machine may be floor, bench or wall mounted.

Belt length .....90 in.
Belt width ..... 2 in.
Motor .....¾ HP
Drive pulley .....10 in.
Belt speed (with 1740 rpm motor)—4600 sfpm.

For small parts, difficult inside and outside contours, tight radii, etc. May be used on applications requiring contact roll, platen, or slack belt polishing. Product of Bush Mfg. Co.

This brush backed polishing head is equally at home on a lathe, automatic set-up or portable tool. The brush back allows the coated abrasive strips to conform to almost any shape so that irregular surfaces, both convex and concave, can be polished. Replacement of the abrasive strips is simple and the rate of metal removal can be controlled by the abrasive grit. Life of the abrasive is said to be longer than with most machines due to the continual flexing of the strips, this action automatically cleans the abrasive and thus prevents loading. Product of Grinding and Polishing Machinery Corp.



A modification of the standard yoke machine by adding an extension arm. While this machine was specifically designed for polishing turbine blades for jet engines, it is equally applicable to the polishing of any small contoured parts or sections.

Belt length .....132 in.
Belt width .....¼ to 2 in.
Drive pulley ..... 10 in.
Belt speed (with 6" pulley)—2800 sfpm.
Contact wheel diameter .....½ in. and up.

Tracking adjustment is by screws and constant tension is maintained with a spring loaded idler pulley. Concave sections may be strapped on the free belt areas. Contact wheel is ball bearing mounted. Product of Stephen Bader & Co.

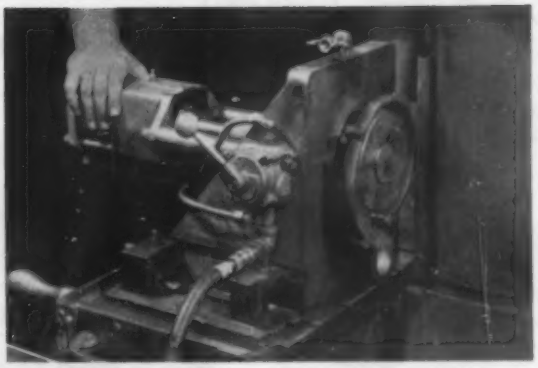
Yoke type abrasive belt grinder adapted for inside curves, small radii and similar applications. The belt can be raised and lowered, swung from side to side and moved in and out within reasonable limits.

Utilizing a fixed size drive pulley with variable diameter contact wheels allows sanding of different internal radii with only simple machine changes. The machine will handle varying widths of belts, tracking adjustment is simple and a quick release tension device permits rapid belt changes. Product of Bush Mfg. Co.

A vertical platen-type abrasive belt grinder equipped with an oscillating infeed table with a micrometer stop. May be operated either wet or dry and is equipped with a 40 gal. coolant tank for wet applications.

Belt size .....8 x 107 in.
Belt speeds .....2550 to 5500 sfpm.
Motor .....5 or 7½ HP

This unit is designed to give the maximum output of duplicate parts, it will remove stock to accurate dimensional tolerances. Flatness tolerances can be held very closely. The machine utilizes a 9 x 12 in. hardened and ground steel table. Product of Engelberg Huller Co.



A heavy duty semi-automatic oscillating unit designed to polish out-of-round parts or it may be locked in position to handle cylindrical work. This unit may be used with either coated abrasive belts or wheels or with buffing wheels as shown.

The oscillation is controlled by a timer controlled air cylinder arrangement which can be automatically set to pre-determine actual contact time. Flexibility of positioning of both units allows polishing at almost any desired angle. Product of Acme Mfg. Co.

A rotary automatic setup involving the use of an automatic rotary turret around which a wide variety of abrasive belt machines, abrasive wheels, and buffing and polishing heads can be placed. Each head is set at the desired angle with relation to the work piece so that only a certain segment is finished when the table indexes under each head.

Through the use of coated abrasive belts or coated abrasive wheels; straight, curved or contoured surfaces can be polished. Only one operator is needed per machine to load and unload the work.

Table speed .....variable to 40 rpm.
Power .....7½ HP
Drive .....vari-speed Geneva drive.

This type of machine is well adapted for finishing odd shapes. Product of the Hammond Machinery Builders, Inc.

Esutcheon plates were formerly roughed on a backstand idler by hand while mounted on a wood block; then semi-finished manually on a buffing wheel with abrasive compound; then color buffed. Each operation averaged about 310 parts per hour.

This machine is equipped with a two-head abrasive belt grinder with a specially molded conveyor belt. The first two operations are combined and the quality of finish produced eliminates the necessity for color buffing. Production rates have been increased to 3600 pieces per hour with one operator to load and unload. Product of Engelberg-Huller Co.

AT CANADIAN PRATT AND WHITNEY AIRCRAFT...

ALMCO barrel finishing SAVES 97% on deburring and finishing of spark plug bushings

CUTS DEBURRING AND FINISHING COSTS $2,430 — Threaded spark plug bushings used in famous Pratt & Whitney aircraft engines will be deburred and finished for $2,430 less this year with Almco equipment and processes. Maurice Harrison, Supervisor of Process Planning, shows the small part on which this savings will be made.

● **SAVES .10125 ON EACH BUSHING**—Deburring and finishing threaded spark plug bushings like the one shown at the left, formerly cost $104.20 per thousand when CP & W used speed lathes, portable power tools and other hand methods.

After installing two ALMCO DB-200 Supersheen units, records showed a cost cut of 97%. This equipment turns out 1,000 bushings in 45 minutes, releases grinders and finishers to other duties. Cost reports showed:

$104.20	cost per thousand with power tools.
2.95	cost per thousand with 2 ALMCO barrels.
$101.25	Savings per thousand pieces.

This year CP & W will process 24,000 spark plug bushings, *with a total savings of $2,430 on this one part alone.*

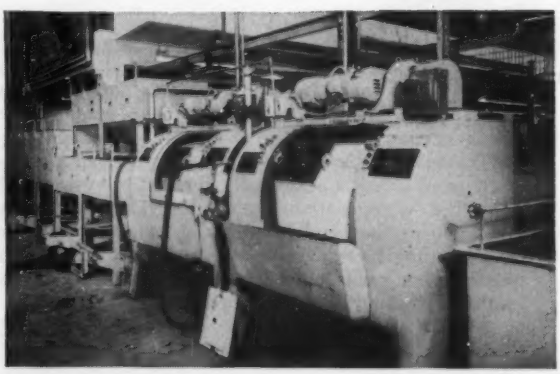
PRACTICALLY ELIMINATES REJECTS—Before installing controlled-type barrel finishing, parts inspectors returned for re-work an average of 125 bushings out of every 1,000 (12½%). With Almco Supersheen equipment and processes, these parts are now finished to a degree of uniformity that is virtually free of rejects.

DESIGNED FOR MANY METAL FINISHING OPERATIONS—In addition to deburring and finishing, ALMCO equipment and processes are used for descaling, degreasing, grinding, burnishing, work-hardening, rust-inhibiting, polishing, etc.

ALMCO has facilities throughout the United States for running sample parts. Write us on your letterhead for the address of an Almco sample processing laboratory or branch office in your area. Your sample, with your specifications, will be handled promptly. You'll get a complete report on where you can save deburring and finishing costs, how you can improve product quality and appearance, and what method and unit is best for your operation. Or, if you prefer, ask an Almco sales engineer to call you.

SEND FOR FREE 52-PAGE BOOK

Full of facts and processes on barrel finishing. Includes detailed cost chart on finishing of typical parts. Send for your copy today.



Two Model DB-200 Almco machines, using Supersheen bonded abrasive chips and compounds, deburr and polish 1,000 spark plug bushings in 45 minutes at Canadian Pratt and Whitney.

ALMCO

DIVISION OF QUEEN STOVE WORKS, INC.

73 Marshall Street • Albert Lea, Minnesota

Sales and Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England

For more information circle No. 81 on the Reader Service Card

DE VILBISS IN NEW WEST COAST HEADQUARTERS

New DeVilbis headquarters in Los Angeles

A new specialized structure recently completed in Los Angeles as West Coast headquarters for the DeVilbiss Company, manufacturers of complete spray finishing equipment with a Pacific Coast plant in Santa Clara and main plant in Toledo, Ohio. The new plant is now in operation as sales and service center, rebuilt exchange and warehouse unit and offers a customer research laboratory equipped with facilities for demonstration and testing of spray applications of all kinds for DeVilbiss users and prospective customers. The new branch, five times the size of former quarters, is geared to keep pace with the rapidly expanding demands of the West Coast.

WEAVER NAMED CHAIRMAN OF ASTE RESEARCH COMMITTEE

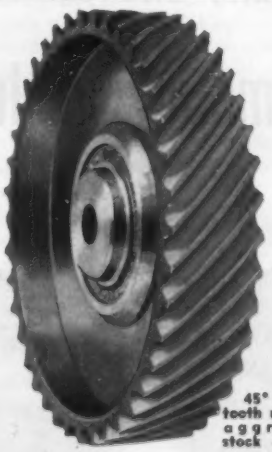
James R. Weaver of the Westinghouse Electric Corp. has been elected chairman of the American Society of Tool Engineer's Research Fund Committee. Established to develop research fund projects, the committee is currently working on an "Evaluation of the Metal Cutting Literature."

Other members of the committee are: Robert B. Douglas, Specialloid Ltd., St. Eustache, Quebec, Canada; Wallace E. Carroll, Size Control Co., Chicago, Ill.; Dwillard J. Davis, Ford Motor Co., Dearborn, Mich.; William E. Mahin, consultant, Cambridge, O.; Daniel J. Martin, Hughes Tool Co., Houston, Tex.; George B. Hawkins, Purdue Univ., Lafayette, Ind.; Louis Polk, Sheffield Corp., Dayton, O.; Joseph Sunnen, Sunnen Products Co., St. Louis, Mo.; Gervais W. Trichel, Amplex Div., Chrysler Corp., Detroit, Mich.; Kenneth R. Beardslee, Metallurgical Products — General Electric, Detroit; Harry E. Conrad, ASTE secretary; and Leslie S. Fletcher, ASTE research director.

A BETTER BACK-UP WHEEL

R57

FOR YOUR ABRASIVE BELTS



45° scoop tooth used for aggressive stock removal

NOW IN POPULAR 14" DIAMETER SIZES AT BIG SAVINGS

Now—new production techniques allow you to SAVE on new R-57 Rubber Contact Wheels! They have all the well-known features of R50 and R54 models — longer belt life, oil resistant rubber, wet or dry use, heat dissipation, maximum safety, etc. And what's more, they have a 30% trade-in value! (The R57, R50 and R54 wheels come in many popular sizes, ½" to 22" diameters in 1" to 6" widths, or to your specifications.)

14"

WIDTH OF FACE				
TYPE	1"	2"	3"	4"
14" PLAIN	32.00	34.00	36.00	38.00
SERRATED	37.00	39.00	42.00	44.00

IN PLAIN OR SERRATED FACE IN ALL DUROMETERS

A WHEEL FOR EVERY OPERATION

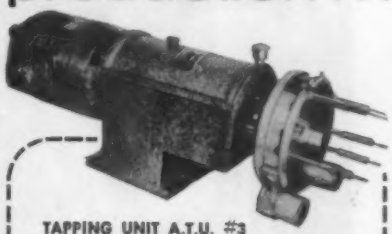
45° Standard Stock Removal
Slit Serration
Aggressive Contact Work
"X" Serration
Moderate Contour Work
Cosmo Expander
Operates Without Backstand Idler

DElta 6-8900

CHICAGO RUBBER COMPANY, INC.
851 MARKET STREET • WAUKEGAN, ILLINOIS

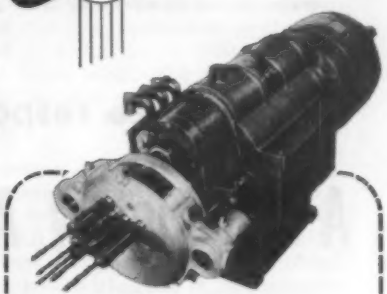
For more information circle No. 24 on Reader Service Card

The Tap and Drill Team for your hole production . . .



TAPPING UNIT A.T.U. #3
Completely self-contained all-electric lead screw precision unit. Quickly interchangeable for fast single or multiple spindle head operation. With forward and reverse electro-magnetic clutches and variable torque control.

Ettco-Emrick **TAP & DRILL TWINS**



DRILLING UNIT D.U. #2
Completely self-contained precision unit with powerful air feed and hydraulic control. Quickly interchangeable for fast single or multiple spindle head operation.

Used singly or in combination they offer the flexibility and adaptability to meet modern drilling and tapping requirements. When combined with Ettco-Emrick multiple spindle heads they'll set new standards of precision, speed and economy.

SPECIAL MACHINES
Building the Twins into high production special machines is simple, because all units are electrically controlled and all components are standardized equipment. We can supply the assembly complete with tooling — or you can do it in your own plant.

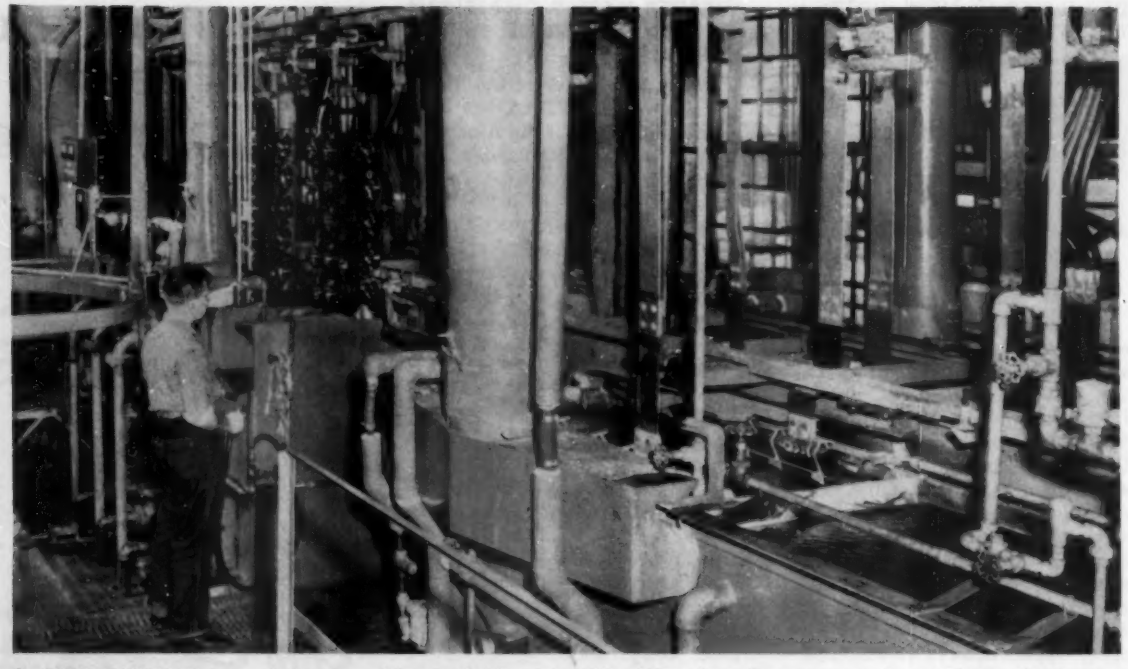
Write for details

Authorized distributors in U.S. and Canada

ETTCO TOOL & MACHINE CO., INC.
586 Johnson Avenue, Brooklyn 37, N. Y.
Chicago • Detroit • Los Angeles • Indianapolis

The only full line manufacturer covering the entire small hole field: Tapping Attachments • Multiple Heads • Drilling & Tapping Units and Machines • Special Machines • Indexing Fixtures • Tap & Drill Chucks

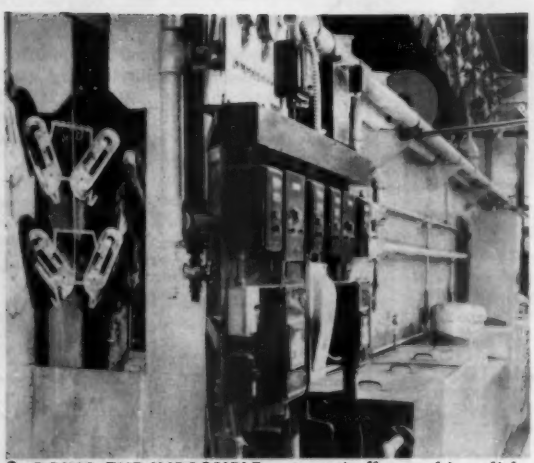
Circle No. 85 on Reader Service Card



1. ONLY ONE MAN is needed to run this completely automatic plating line. From a central control console the operator can set up what ever cycle is needed for the parts being plated. This line applies copper, nickel and chromium.

To centralize responsibility and control . . .

A Completely Automatic Finishing Department



2. DOING THE IMPOSSIBLE automatically on this polishing and buffing line that can be operated as a separate finishing unit or can be tied into any other finishing line. The only hand labor is loading and unloading when automatic transfer to the next operation is not possible.

3. JUST CLEANING or cleaning and the application of a phosphate coating can be done here. Depending on the work load, the operator includes or excludes any single step or group of steps in the set-up. The line feeds from and into all others.

FOR the past several years there has been a distinct trend among custom die casting shops toward furnishing completed parts or components rather than rough trimmed castings. Initially this was evident in the greater amount of light machining, such as small hole drilling and tapping, done by the die caster. Later more complex machining was added as well as complete surface finishing. Finally some shops have undertaken to furnish the customer with completely finished sub-assemblies.

There has been good reason for this shift away from a pure foundry. In many cases the competitive situation has forced the change, but more importantly has been the demand of the customers to centralize responsibility. Probably one of the most common difficulties has been to fix the fault, when it existed, for poor surface finishes. The foundry blamed the custom plating establishment and the plater blamed the foundry.

But centralization of authority or responsibility has not been the only gain that has resulted from this change. There has been an economic gain for the user of die castings; and this, in turn, has broadened the use of die castings with subsequent gains for the foundry.

Because of the many advantages to be gained, Precision Castings Co. has installed a new and very extensive finishing line in one of its eastern plants. Because of the very large volume of castings of all sorts that normally flow through the plant it was possible to design and install equipment that is as fully automatic as can be designed. In every case, whether it be cleaning, buffing and polishing, conversion surface treatment, plating or painting the finishing line is set-up so that one man can, as a rule, operate it. This operator is charged with loading and unloading and is able to operate the entire line from a single control console. Some of the different finishing operations that can be done are shown in the illustrations.

Electro-Plating:

The automatic plating line shown in figure 1 was designed specifically for this service. It can plate copper, nickel, chromium and with a special transfer bright brass. All of the equipment was designed and built by the Udylite Corp. and can handle parts from one square inch up to parts 14 x 36 inches. Maximum conveyor speed is 140 racks per hour. One man operates this line except when bright brass is to be plated, when a second man is needed to transfer the racks to a separate plating line.

Automatic Polishing:

The automatic polishing equipment, figure 2, was specially built by the Murray-Way Corp. to give the highest degree of flexibility possible. With this equipment the buffing and polishing compounds are automatically applied and polishing heads can be so positioned that parts previously considered very difficult or impossible to polish on an automatic machine are now easily handled.

Chemical Coating:

This line, figure 3, includes an automatic washer, a phosphate coater and a dryer. The cycle through the 44 foot long unit can be pre-set to include or skip any step along the unit. Where a phosphate coating is used it is a controlled 200 mg. per sq. ft. All of the equipment was built by Metalwash Corp. for the particular job and includes many special controls.

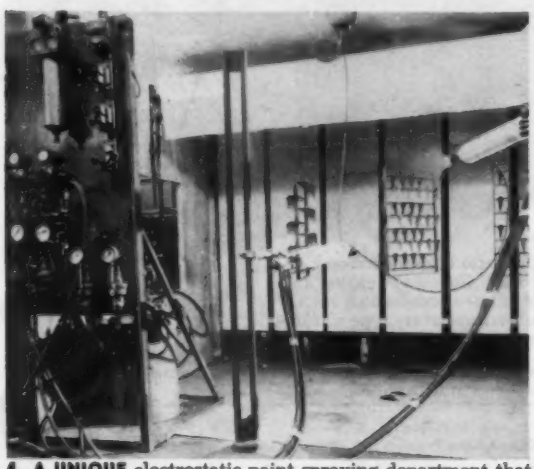
Painting:

The control panel and spray booth for the electrostatic paint spray equipment is shown in figure 4. This equipment, built by the Scientific Electric Corp., is said to be one of the few electrostatic installations that can handle metallic and wrinkle finish paints. Through the use of the new equipment, production has been increased from 150 up to 1000 parts per hour with wrinkle finish paint. The power supply operates at higher than usual voltage—150 kv peak—and a maximum of one and half milliamperes.

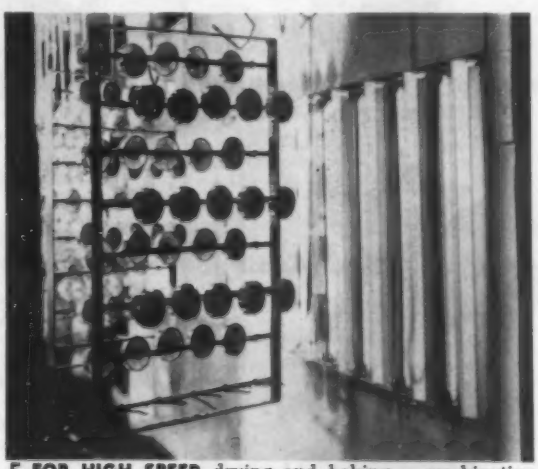
Baking:

The system provides a combination radiation and convection oven so designed that the equivalent of a 30 minute bake can be secured in 20 minutes. The present oven, 14 x 25 ft., was built by the Jensen Co. and is designed so that additional units can be added when necessary. It contains about 50 ft. of conveyor.

In a subsequent article, PMM will present many of the newest developments in automatic finishing equipment.



4. A UNIQUE electrostatic paint spraying department that can handle all types of sprayable finishes including metallic and wrinkle finish paints and lacquers. Up to 12 spray guns can be operated at the same time when necessary.



5. FOR HIGH SPEED drying and baking a combination of convection and radiant heating has been found most desirable. Pre-heating and drying is done in the convection end of the oven while baking is done in the infrared section.

TUMBLE
GRAV-I-FLO
FINISH

Gives you these extras in your tumble finishing!

1. Produce Consistent, Uniform, Higher Lustre Finish!
2. Handles 25% More Volume in 30% Less Floor Space!
3. Super-Brite Chips and Compounds Cut Faster, Slash Processing Time!
4. Eliminate Transfer of Parts Between Roughing and Finishing!
5. Obtain Smoother Surface Preparatory to Plating!
6. Cut Direct-Labor Costs!

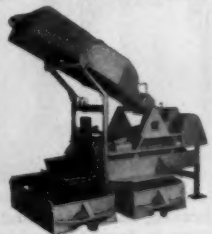
COMPLETE EQUIPMENT, ACCESSORIES AND SUPPLIES

MODEL 66"—TWO COMPARTMENTS

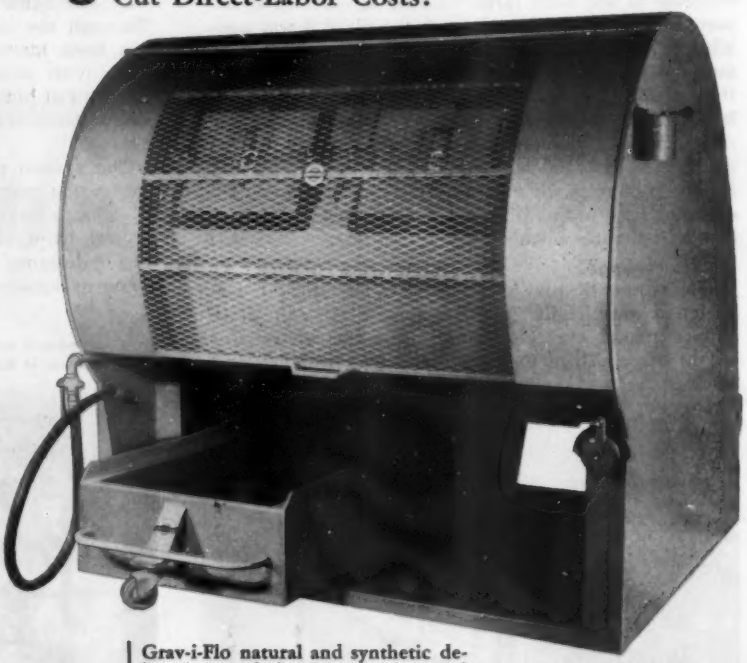
MODEL 36"—TWO COMPARTMENTS

MODEL 32"—TWO COMPARTMENTS

MODEL 24"—TWO COMPARTMENTS



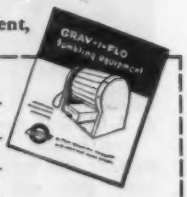
CHIP SEPARATOR AND GRADER



MODEL 48"
TWO COMPARTMENTS

COMPOUNDS Grav-i-Flo natural and synthetic deburring and finishing chips and highly developed compounds consistently outperform every type of tumbling process offered on the market.

SEND FOR CATALOG showing complete line of Grav-i-Flo equipment, accessories and supplies.



Grav-i-Flo Corp., PMM 3, Sturgis, Michigan
☐ Send complete catalog. ☐ Have Sales Engineer call. ☐ We are sending samples.

Company_____

Name_____ Position_____

City_____ State_____

GRAV-I-FLO CORPORATION, 400 Norwood Avenue, Sturgis, Michigan

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DATA IN ADS—continued

74. "Powder Metallurgy Today"—is the title of a publication offered by F. J. Stokes Corp. Also available is Catalog 815, describing their complete line of powder metal presses.

Furnaces

34. Saves $5,400—Bulletin C-80 from Eclipse Fuel Engineering describes a double-chamber dry-hearth-type metal melter for aluminum. Advantages for both large and small operations are described.

18. 20-pound Arc Furnace—Complete details and prices are available from British Industries Corp. on a new 20-pound indirect arc furnace designed and used by investment casters.

42. Mesh Belt Furnaces—Bulletin 454 from Harper Electric Furnace Corp. describes the higher furnace production possible with their line of mesh belt furnaces.

51. Small P-T Furnace—Full details have been released by Detroit Electric Furnace Div., Kuhlman Electric Co. on a pot-tilting electric furnace for laboratory or pilot-plant metal melting.

53. Resistance Furnace—Bulletin No. 321 from Lindberg Engineering Co. describes an improved electric resistance furnace for melting aluminum, magnesium, zinc and lead.

102. Slug Casting Machine—Full information is available from Stroman Furnace & Engineering Co. describing a new machine that casts slugs from ingots in one complete operation.

Foundry Equipment, Supplies

73. Stainless Steel Ladles—and skimmers for non-ferrous metals are listed in data from Spincraft, Inc. Sizes in stock and prices are included.

Refractories

96. Refractory Mold Materials—Literature is available from Harbison-Walker Refractories Co. describing mold materials that feature a uniform coefficient of thermal expansion up to 2400 F, higher fusion point, and other advantages.

Fluxes

43. Fluxes for Aluminum, Zinc—A technical bulletin giving important information on fluxing procedures and improved shop practice is available from Haviland Products Co.

Lubricants

3. Colloidal Dispersions—Bulletin 425 from Acheson Colloids Co. describes the different lubricants available for casting use.

38. Cutting Oil—Bulletins are available describing Fiske Bros. Refining Co.'s "Darl" base cutting oil and other specialty lubricants and coolants.

39. Die Coatings—A leaflet offered by Foundry Services, Inc. describes the advantages of their "Foseco Dycotes" for both permanent mold and die casting use.

Temperature Control

78. Tubeless Instruments—Bulletin JS published by West Instrument Corp. describes a series of tubeless, multiload temperature control instruments.

Hydraulic Fluids

72. Fire Hazard Reduction—Details have been released by Shell Oil Co. on their "snuffer" type hydraulic fluid, with water dispersed in oil to reduce fire hazards near hydraulic systems.

20. Safety Booklet—Form 40134 entitled "Ucon Hydrolubes Spell Safety," published by Carbide & Carbon Chemicals Co. div. of Union Carbide & Carbon Corp., discusses the elimination of fire hazards using their new CP-type hydraulic fluids.

76. Piston-type Accumulators—Detailed literature and prices are available from Superior Hydraulics Div., Superior Pipe Specialties Co. on their piston-type accumulators for hydraulic systems.

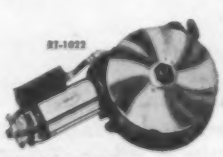
Continued on page 79

The place to save money on drill press work

The actual machining time in drilling, tapping, reaming or counterboring is usually fixed by the nature of the tool and material.

But the time taken in getting the tool to and from the material and the material to and from the tool is pretty much up to the ingenuity of the tool engineer. It's here that costs can be cut—added profits made.

It's here that two Bellows "Controlled-Air-Power" Devices can fit into your picture: The Bellows Drill Press Feed and the Bellows Rotary Work Feed Table. The Bellows Drill Press Feed attaches to the star wheel shaft of any standard drill press. A touch on the operating lever and the Feed advances the quill rapidly to the work, feeds the tool under hydraulic control through the work—and returns the quill quickly to starting position. The Bellows Rotary Work Feed Table feeds the parts swiftly, accurately and safely to the tool. All the operator has to do is load and unload—the rest is automatic.



WRITE FOR THESE TWO FREE BOOKS

Quick reading facts that will help you make more money on your drill press operations. Write The Bellows Co., Akron 9, Ohio, Dept. PMM-357.

In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

Ask for Bulletins DF-110R or RT-1022.

7360-1

The Bellows Co.

AKRON 9, OHIO

MANUFACTURERS OF "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

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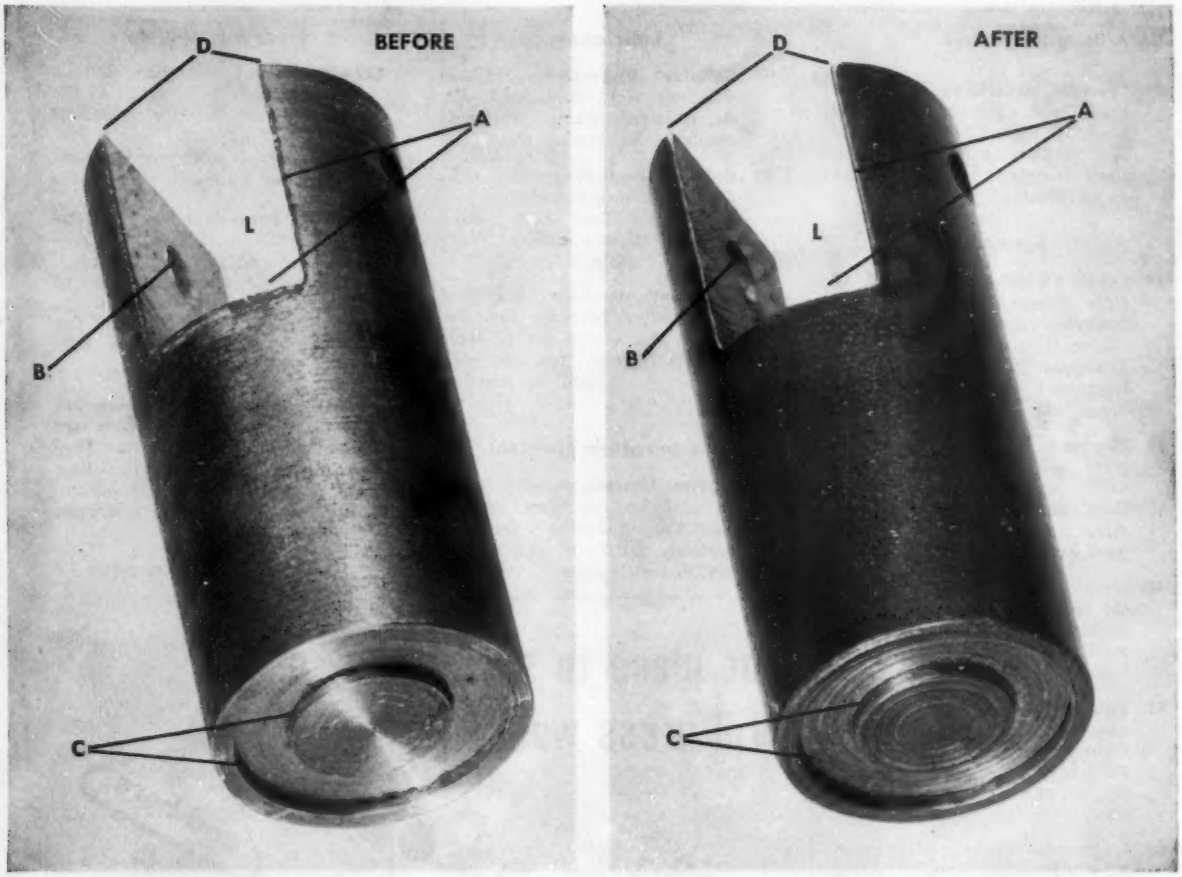
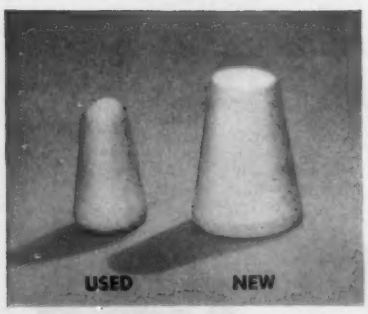


This critical barrel finishing problem solved with "HONITE" Brand CeramiCones



AFTER 550 HOURS use the CeramiCone left retains its exclusive truncated cone shape. Every part of each chip is a working surface—and they're next to diamonds in hardness.

Controls Company of America, Soreng Division, had a major problem in the barrel finishing of mild steel solenoid plungers. Removing milling burrs (A), piercing burrs (B), and burr removal and corner break at (C) with conventional barrel finishing chips was causing much lodging of chip particles in the finished plunger. Two full-time additional inspectors were required to remove these particles.

The company—a leading producer of solenoids—found that a chip large enough to avoid lodging at (C) would lodge in milled slot (L) or would peen corners (D). Too small a chip would fail to remove burrs (A) or would lodge in pierced holes (B).

A "HONITE" Engineer solved this company's problem with CeramiCones—the amazing new precision-molded chips made of high-strength, non-crystalline ceramic. Results: CeramiCones stopped lodging *anywhere* and the additional inspection operation was discontinued. Finishing costs per thousand plungers dropped to ½¢ with improved surface finishes, impingement and nicking was eliminated, and because of faster burr removal the time cycle was cut ⅓ with improved corner break.

"HONITE" Brand CeramiCones can solve your barrel finishing problems, too. Send us your work samples today for test processing. Write Minnesota Mining and Manufacturing Co., Dept. FF-37, St. Paul 6, Minn.

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Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City. Makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

For more information circle No. 89 on the Reader Service Card

DATA IN ADS—continued

Piston Rings

67. Plunger Rings—Complete information is offered by Precision Piston Rings, Inc. on their unbreakable stainless steel die casting plunger rings.

Barrel Finishing

79. The "Abbott Method"—of barrel finishing is fully described in a booklet offered by the Abbott Ball Co. Equipment, materials, and their use are discussed, and the company's new welded steel barrel is introduced.

81. Finishing Costs, Processes—A 52-page book published by Almco Div. of Queen Stove Works, Inc. gives facts, processes on barrel finishing. Included is a detailed cost chart on the finishing of typical parts.

86. Tumble Finishing—A complete line of tumbling equipment, accessories, and supplies is described in a catalog from Gravi-Flo Corp.

94. Complete Finishing—Basic processes, chips, compounds, and a complete equipment line is described in a technical data folder from Roto-Finish, Inc.

Abrasive Belt Equipment

87. Double Spindle Lathes—Hammond Machinery Builders has issued a catalog on their line of double spindle lathes, featuring a separate motor, control, and variable speed drive for each operator.

Abrasive Blast Equipment

92. New Design—Bulletin 1403 from Pangborn Corp. describes the design improvements which enable the company's "Hydro-Finish" equipment to offer easier handling and increased efficiency at lower costs.

Cleaning Machinery

91. Low-Cost Metal Cleaning—in aircraft production is explained in a 48-page illustrated booklet, "How to Clean Metals in Aircraft Production," published by Oakite Products, Inc.

95. Small Parts Drying—A four-page folder on the centrifugal air drying of small parts has been issued by New Holland Machine Co.

Paint Spray Masks

83. Finishing Costs Cut—Free literature from Conforming Matrix Corp. explains how C-M products cut finishing costs through increased production.

Drilling, Tapping Heads

82. Drill Press Savings—Two bulletins from the Bellows Co. contain quick-reading facts to help make more money on drill press operations with several new time and labor saving devices.

85. High-Speed Production—Complete details are available from Ettco Tool & Machine Co., Inc. on drilling and tapping equipment that can be built into automatically-controlled, high-production machines.

90. Rotary Tables—Full details are available from Morrison Engineering Co. on rotary tables which give fast, precise workpiece positioning to cut mold-making costs.

MILNE OPENS NEW OFFICE AND TOOL STEEL WAREHOUSE

A. Milne & Company, Inc., New York, N. Y., nationwide distributor specializing in solid and hollow tool steels, announces the opening of a new office and tool steel warehouse in St. Louis, Missouri effective January 1, 1957. The Milne St. Louis sales office will be moved to the new location.

Users of Hammond Junior Automatics report 3 to 7 times faster finishing than hand methods. The Operator merely loads and unloads the machine, result . . . . faster, better and more uniform finishing, more pieces per hour with less operator fatigue.

SEND SAMPLES: Send us one finished and several rough samples. You will receive a complete Engineering Report and Production Analysis without obligation.

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SEE US AT BOOTH 165, WESTERN METAL SHOW
Los Angeles, March 25-29

For more information circle No. 88 on Reader Service Card

PMM USEFUL LITERATURE, CATALOGS, MANUALS

any of these technical publications may be obtained by circling the appropriate numbers on the Reader Service Cards, Pages 64-65

PMM PROCESSES

Powder Metallurgy: 154
Hoeganaes Sponge Iron Corp., 6-page folder. The success of electrodes for the welding industry produced from iron powder is described in Form 106, with performance factors and AWS specifications included. Technical data is also presented on an iron powder, Ancor W-428, used as a coating for the rods.

Investment Castings: 155
National Precision Casting Corp., 4-page folder. Seven reasons tell why investment casting may be the best method for intricate small parts production. Six examples of investment cast parts are described and illustrated.

Aluminum Alloy Die Castings: 177
Empire Die Casting Co., 4-page folder. The company's services and facilities for aluminum alloy die casting are described. Included is a table of eight alloys available, giving their designations, compositions, and physical properties.

Steel Castings: 178
Dodge Steel Co., 20-page folder. The company's revised specifications folder contains a complete description of Dodge metals for casting. Also included are tips on buying castings and a hand glossary of terms for the buyer and user of castings.

MATERIALS & EQUIPMENT

Metal Powders Specifications: 156
Charles Hardy, Inc., 21-page data book. A reference book on powdered metals, it includes specifications of powders of all types, both elements and alloys. Given are compositions, physical properties, screen analyses, and other useful information.

Hydraulic Trim Press: 157
Buffalo Metal Container Corp., 2-page folder. A high speed 20-ton hydraulic trim press specifically designed for the die casting industry is described. Several unique features of the machine are explained, and typical applications are given.

Die Casting Machines: 158
A. Triulzi, S.A.S., 8-page folder. Technical information is given on four models of the company's die casting machines. Important features of the machines are described and illustrated, and specifications are charted.

Die Casting Machines: 159
Peco Machinery Sales., 5 folders. A series of two-color folders describes five models of the company's die casting machine line. Construction features, hydraulic systems die-locking mechanisms, injection units, and ccmplete electrical sequence control are among the features covered. Complete charts of specifications are given.

Wall-Mounted Pyrometer: 160
Illinois Testing Laboratories, Inc., Single-page bulletin. Bulletin No. 2569 describes a wall-mounted pyrometer with a flexible arm, designed to combine the convenience of a portable with the instrument protection of a wall-mounted unit. Specifications are given for nine models, covering ranges from 0 to 2,000 F.

Graphite Tube Furnace: 161
Harper Electric Furnace Corp., Single-page bulletin. Bulletin CT-1156 describes the company's line of graphite tube furnaces for high temperature research and special production work. A table of sizes and dimensions covers 17 models with ranges of 1200-6300 F.

Pre-Alloyed Steel Powder: 162
Vanadium-Alloys Steel Co., Two single-page bulletins. Increased performance and a 34 percent cost reduction on one application of the company's steel powder is described. A data sheet gives descriptions of the complete line of pre-alloyed powders.

Brass, Bronze Ingot Bars: 163
I. Schumann & Co., 20-page brochure. A new brass and bronze ingot, produced by the company's "C.P." process, is described in a brochure entitled "Above and Beyond the Specifications." Advantages of the new process are discussed, and illustrations compare the new ingots with those produced by older methods.

Synthetic Paraffin: 164
Moore & Munger, 4-page brochure. A new synthetic paraffin imported from South Africa is described in this three-color brochure. Chemical characteristics and possible applications are discussed, and test results are charted.

Temperature Control Bulletin: 165
Burlington Instrument Co., Single-page bulletin. Bulletin 106 describes the company's model L-1S temperature control. Included are descriptions of its differential expansion operation, specifications giving temperature ranges, tube sizes, and accuracy. The model can be used in either liquids or gasses for temperatures up to 1,000 F.

Electronic Indicator: 166
Cleveland Instrument Co., Inc., Descriptive literature is available on a portable dimensional gage and comparator which measures to millionths of an inch. The design combines the accuracy of a laboratory instrument with the versatility required for shop inspection and gage room use.

Low Temperature Brazing: 167
Handy & Harman, 4-page bulletin. A recent issue of the company's publication, "Low Temperature Brazing News," describes a successful application of automatic brazing of stator blade parts. A discussion of proper fluxing is also included.

Continued on page 82

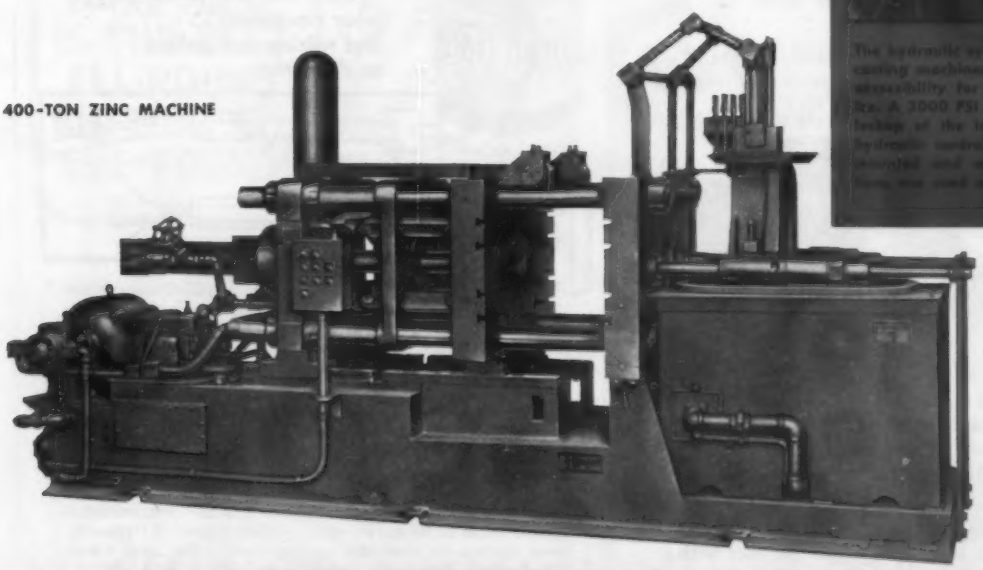
Your Good Judgment is Confirmed When You Buy . . .

B&T DIE CASTING MACHINES

In many industrial centers you'll find leading die casters using B&T die casting machines — purchased by smart production men who, having carefully investigated and compared, choose them in preference to all others. These men know that for castings of extreme accuracy, excellent density and finish, B&T Die Casting Machines can not be beat. And, furthermore, that they'll give you top production with a minimum of maintenance.

13 MODELS thoroughly proved by many years of actual service — ranging in capacity from 100 to 750 tons — for zinc, aluminum and brass. EACH DESIGNED AND BUILT TO THE SPECIFICATIONS OF PRACTICAL DIE CASTERS AND DEVELOPERS OF DIE CASTING MACHINES WITH OVER 35 YEARS OF EXPERIENCE.

400-TON ZINC MACHINE



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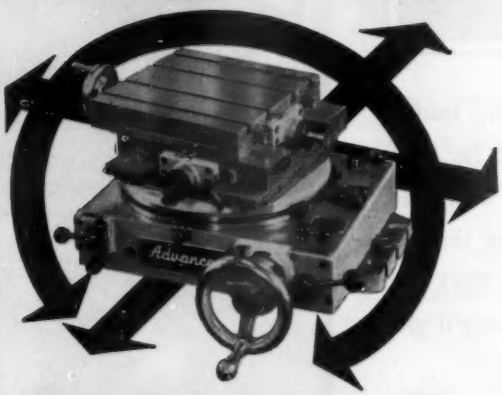
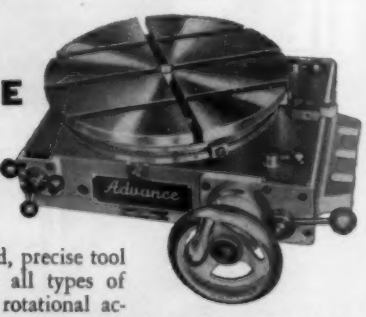


ADVANCE CROSS-SLIDE ROTARY TABLE

Permits fast precise positioning of work-piece from ONE SET-UP. No unclamping and reclamping on your standard vertical mill equipped with ADVANCE Cross-Slide Rotary Table. Only your milling machine's table movement limits the size radius you can cut.

Ideal for tools, dies, jigs, fixtures, gauges, patterns, molds, cams, templates, models and experimental work.

ADVANCE 15" ROTARY TABLE



This rugged, precise tool is designed for all types of work requiring rotational accuracy. Its maximum speed and precision and minimum maintenance fills the need for a precision unit at a moderate price.

The best quality of materials and workmanship, combined with high accuracy, provide the user with a top quality precision tool.

Full Details on Request

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USEFUL LITERATURE

continued from page 80

20-Ton Hydraulic Press: 168

Loomis Engineering & Mfg. Co., 8 pages, bulletin and price list. Bulletin 341B describes the company's standard 20-ton hydraulic press. Dimensions and specifications are given, and accessory equipment is discussed. A complete price list is included.

Sweeping Brushes: 169

Osborn Mfg. Co., 4-page folder. A new bulletin describes five sizes of master-sweep brushes. Advantages of the company's "Korfil" brush material are described, and various other type brushes are illustrated.

Heat & Fluid Processing: 170

Selas Corp. of America, 12 page brochure. A recent issue of the company's publication, "High Gradient," discusses new developments in heat and fluid processing. Humorous anologies are used in discussing various company services.

Electronic Instruments: 171

Simpson Electric Co., 6-page folder. Bulletin No. 2057 describes the company's line of panel instruments. Specifications and illustrations of 800 sizes and types of electronic instruments are included.

Induction Heating Equipment: 179

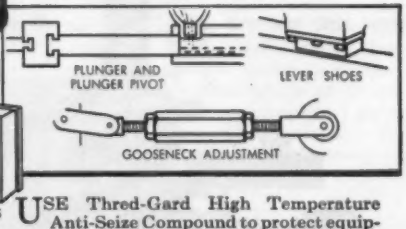
Lepel High Frequency Laboratories, Inc., 36-page catalog and data book. Designed to illustrate how the company's induction heating equipment performs metal heating jobs faster, better, and more economically, the book includes a section explaining the principles of induction heating. Many practical applications for a

Continued on next page

In ½, 1-pint and quart cans.

HOLD DOWN THOSE DIE CASTING COSTS

Protect the "hot spots" in your equipment . . . End seizing and galling of die fittings



USE Thred-Gard High Temperature Anti-Seize Compound to protect equipment and fittings up to 1200°F. Eliminate production losses and maintenance costs due to heat strain, seizing and galling.

Here's what a drop or two of Thred-Gard will do:

Die casting machines—Reduce down time by insuring continuous, long lasting operation of plunger, plunger pivot, lever shoes and gooseneck adjustment.

Die casting dies—Insure efficient, uninterrupted operation of ejector pins. Prevent thread fracture on screws and hollow head bolts due to seizing and galling—yet, initially, permit them to be drawn to a greater degree of tightness. Save money on your die casting operations. Ask about Thred-Gard. Request a free sample.

Crane Packing Company, 6473 Oakton St., Morton Grove, Illinois. (Chicago Suburb). *In Canada: Crane Packing Co., Ltd., Hamilton, Ont.*

JOHN CRANE **CRANE PACKING COMPANY**

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variety of operations are explained and illustrated. The company's line of induction heating equipment is described, and specifications are given.

Zirconium Production: 180
Carborundum Metals Co., Div. of Carborundum Co., 4-page bulletin. The first issue of the company's bi-monthly publication, "More Zr Facts," describes the tenfold increase in zirconium production in the last five years. Production process and zirconium uses are also discussed.

Compact Strength Tester: 181
Metals Disintegrating Co., Inc., single-page bulletin. A transverse tester for determining the strength of fragile materials is described. Its application in the metal powder industry is discussed, as it can be used to test the strength of metal powder compacts in the unsintered state.

Air, Vacuum Pumps: 182
Leiman Bros., Inc., 16-page catalog. Catalog No. 1957 describes the company's air and vacuum pumps, gas boosters, and air motors. Details of construction, dimensions, capacities, performance curves, and installations are given.

Optical Instruments: 183
Bausch & Lomb Optical Co. Ways to use low-cost optical instruments to simplify and speed manufacturing and inspection operations are outlined in a new booklet. Entitled "Industrial Optical Aids," it contains up-to-date information on a wide assortment of inexpensive precision optical instruments. Suggested uses are given for faster, easier, lower-cost production. Items discussed include magnifiers, microscopes, wide field tubes, macroscopes, and comparators.

"FISKE'S DARL BASE IS THE BEST ALL-ROUND CUTTING OIL I'VE FOUND"

FISKE'S "DARL" OIL is a base cutting oil for use in working both ferrous and non-ferrous metals. Can be used straight or reduced with mineral oil to suit the metal and work. Non-corrosive. Permits visibility when mixed. Has exceptional anti-weld properties, lubricity and film strength. For better finish of product and longer tool and die life, use "DARL."

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METAL WORKING LUBRICANTS

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DO YOU NEED BETTER METAL CLEANERS FOR THESE JOBS?

This 48-page illustrated booklet tells how to cut cleaning costs in aircraft production

1	**How to clean aluminum before anodizing.** See pages 4 to 8.
2	**How to prepare aluminum for welding.** See pages 10 to 14.
3	**How to prepare aluminum for painting.** See pages 15 to 19.
4	**How to clean aluminum before and after heat treating.** See page 20.
5	**How to strip paint from aluminum.** See pages 22 to 26.
6	**How to clean magnesium.** See pages 27 to 29.
7	**How to install cleaning tanks and spray-washing machines.** See pages 31 to 35.
8	**How to control overspray in paint booths.** See pages 36 to 37.
9	**How to clean engine test cells.** See page 40.

FREE Write for your copy of the booklet.

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Send me a FREE copy of "*How to clean metals in aircraft production*". I am especially interested in the jobs indicated by the numbers I have circled below:

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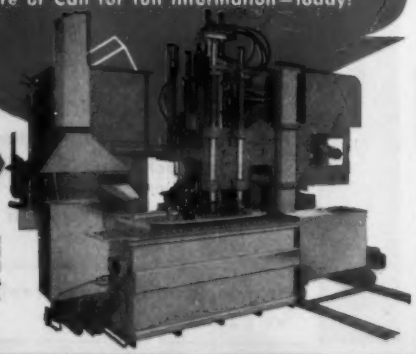
The One and Only Slug Casting Machine for Aluminum Forging and Aluminum Impact Extruders!

Here is Stroman's newest invention that casts slugs from ingots in one complete operation making it possible to produce perfect slugs ready for forging or extrusion, at a speed heretofore thought impossible. Some sizes produced as many as 1500 pieces an hour . . . and a die can be constructed to fit your specific needs.

Operation is completely automatic, operation is simple, and it saves a tremendous amount of man-hours in production. It is foolproof, producing perfect slugs every time, for forging or extruding, with no return scrap metal.

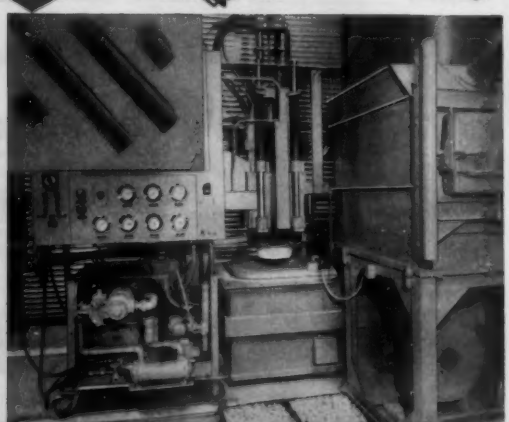
Let us show you the COMOCAST in operation . . . show you its efficiency and metallurgical perfection of each slug . . . even make some slugs to fit your production for you to try. Honest, it's the finest money-saving machine you forgers or extruders have ever had presented to you.

Write—Wire or Call for full information—today!



Showing opposite side of view below.

Showing operating panel, Furnace, and some of slugs and finished extrusions at Impax, Inc., St. Louis, Mo.



STROMAN FURNACE AND ENGINEERING CO.

Franklin Park, Illinois

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FINISHING

Surface Metallizing: 172

Red Spot Paint & Varnish Co., Inc. Single-page bulletin. File No. 4 describes three metallizing surface coatings. Characteristics are charted and application techniques are explained for coatings suitable for interior decorative coatings.

Screen Vacuum Filters: 173

Industrial Filtration Co., 4-page technical bulletin. A new brochure describes operation of an automatic, self-cleaning tubular screen vacuum filter. Schematic diagrams show filtering and backwash cycles. Flow capacities, precoating, and space requirements are also discussed.

Lime Buffing Compositions: 174

Frederic B. Stevens, Inc., Single-page bulletin. A simple 72-hour test of the company's "Slo-Slake" lime buffing compound is described, and six advantages of the product are discussed.

Non-inflammable Paint Stripper: 175

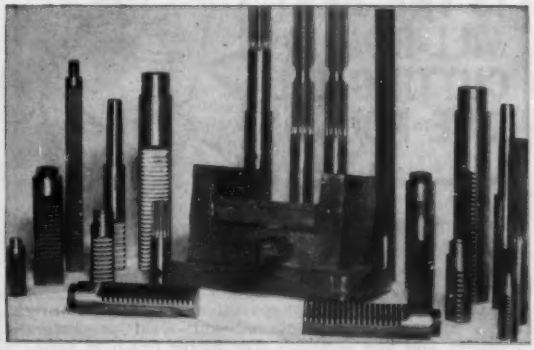
Mitchell-Bradford Chemical Co., Single-page bulletin. Savings in "take-off" time are discussed as the company's new non-inflammable paint stripper is described. The stripper's uses in removing enamel, varnishes, and laquer are included.

Plating & Processing Machines: 176

The Udylite Corp., 4-page bulletin. A two-color bulletin describes the company's line of full automatic plating machines. Distinguishing features are illustrated and described, and operating advantages are discussed.

PEERLESS "FLAME-A-LOY"* PINIONS and RACKS

FOR DIE CASTING & PERMANENT MOLDS



Standardized To Mate and Interchange With Each Other For Longer Wear At Less Cost.

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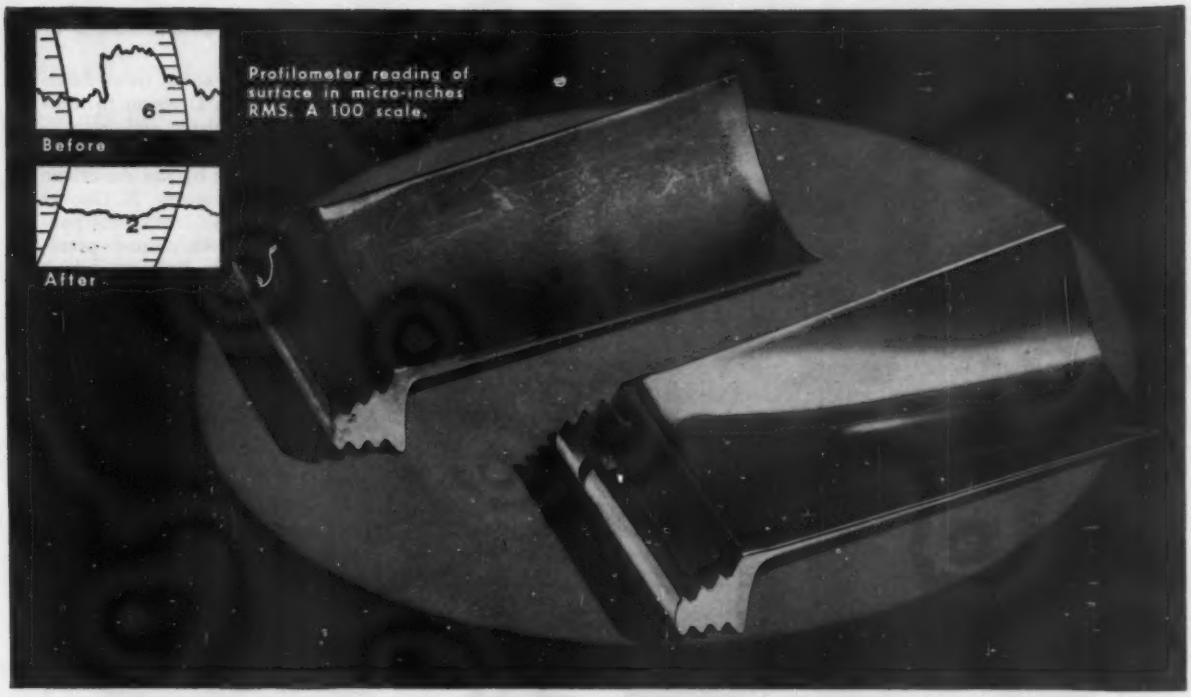

Cut parts finishing costs, maintain exact tolerances, get absolute uniformity with *Roto-Finish* processes

Roto-Finish, pioneers in precision barrel finishing, offer you a complete finishing service. Savings on deburring, descaling, grinding, polishing, coloring and surface improvement are tremendous. Expensive hand finishing methods can be eliminated.

Roto-Finish processes are controlled to produce the finish you need with no significant dimensional changes. You get absolute uniformity of finish in quantity lots.

Many prominent manufacturers now using Roto-Finish processes are saving money on finishing costs. (Names on request).

ROTO-FINISH CHIPS, COMPOUNDS AND MACHINES ARE OF THE HIGHEST QUALITY

Roto-Finish has never sacrificed quality for the sake of price. Through the years, Roto-Finish has carried on a continuous program of process and product improvement to meet the needs of modern industry. When you choose Roto-Finish processes, you can be sure that you are getting the best in supplies, equipment and complete continuing engineering service.

ROTO-FINISH GUARANTEES RESULTS

There is no costly trial and error involved in the purchase of Roto-Finish equipment. You submit unfinished parts to Roto-Finish along with a finished sample and a description of the finish you require. These sample parts are processed in the Roto-Finish Sample Processing Laboratories, where experienced engineers determine the combination of chips, compounds, and machine required to do the job. Roto-Finish guarantees to reproduce the same results in your plant, using the Roto-Finish processes, that are achieved in sample processing. This service demonstrates for you exactly what you can gain by using Roto-Finish processes.

The sample processing service is available to help you with your finishing problem. Take advantage of this opportunity to save on finishing costs. Send samples of finished and unfinished parts and details of the type of finishing equipment available in your plant.

SEND FOR THIS FREE TECHNICAL DATA FOLDER

It describes the basic process, chips and compounds and the complete Roto-Finish line of standard and special machines.

Roto-Finish COMPANY

3716 Milham Road, Kalamazoo, Mich.

P. O. Box 988

Phone: FI 3-5578

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HOLLAND, BELGIUM, LUXEMBURG — N. V. Roto-Finish Maatschappij — Rotterdamseweg 370 A. Delft, Holland.
ITALY — Societa Roto - Finish a R. L. — Sesto S. Giovanni — Viale E. Marelli, 31 — Milan
SPAIN — Instituto Electroquimico, S. A. — Corcega 58 — Barcelona

For more information circle No. 94 on the Reader Service Card

KAPLAN TO ADDRESS DIE CASTING ENGINEERS

The speaker at the March meeting of the Society of Die Casting Engineers, Cleveland chapter, will be Mr. I. Leonard Kaplan, who will talk on Hydraulic Muscles for Die Casting Machines. The talk will cover some basic hydraulics, circuits for die casting machines, hydraulic circuit trouble shooting and briefly on suggested change-over procedure when converting from petroleum base oils to fire resistant hydraulic fluids.

Mr. Kaplan has been associated with the die casting industry for about 8½ years—part of the time in a die casting shop and the balance as sales engineer in hydraulics dealing, in part, with the die casting industry.

BALDWIN-LIMA-HAMILTON FINISHES TRANSFER

Baldwin-Lima-Hamilton Corporation has completed transfer of the manufacturing and sales operations of its hydraulic and compacting press department from the Eddystone Division (near Philadelphia) to the Hamilton Division, Hamilton, O. The operations have been integrated with those of the mechanical press department which has always been in Hamilton. The department is now in normal production.

B-L-H is reputedly the oldest manufacturer of hydraulic presses in the country. Capacities of presses now manufactured at Hamilton range from 30 to 10,000 tons. They are made for shaping metal, powdered metal, wood, pulp, chemicals, rubber, etc.

This man is helping cut small parts drying time just about one-half...

Model 20 New Holland

KREIDER

Centrifugal Dryer

AIR-DRIES...as it SPIN-DRIES!

Now you can *spin-dry* small parts in continuous *fresh air* in as little as 15 seconds . . . cut drying time *just about one-half.*

Double-action drying gives you smooth moisture-free surfaces . . . reduces your finishing problems by eliminating the scarring and marring frequently responsible for costly "rejects."

Speed production . . . cut costs way down with New Holland's easy-to-run Model 20 Kreider Centrifugal Dryer.

Choose from 3 models engineered to meet your requirements: — Standard Model; Standard Model with Supplementary Electric Heat; Standard Model with Supplementary Steam Heat.

— SPECIFICATIONS: —

1 h.p. motor—220, 440, 550 volts—2- or 3-phase—spins 75 lb. loads at 825 r.p.m. . . . Quiet V-belt drive . . . 30-blade suction turbine draws air through spinner . . . Arc-welded steel-plate construction . . . Heavy-gauge woven steel mesh basket . . . Weight: 490 lbs. . . . Floor space: Just under 5 sq. ft. . . . Meets N.F.C. Specs. **Optional:** J.I.C. Control: Mounted on right, left side or wall. 160° supplementary heat: 2350-watt Chromalox, or steam.

Send for illustrated 4-page folder. Address Dept. PM-37 New Holland Machine Company New Holland, Pa.

New Holland Machine Company

For more information circle No. 95 on the Reader Service Card

ENGINEERED CASTINGS DIV. FORMED

Organization of a new Engineered Castings Division to integrate five foundries and coordinate sales of their output has just been announced by the American Brake Shoe Company. N. George Belury, vice president of the parent firm, has been named president of the new division, which will make a wide variety of plain and alloyed iron and steel castings.

The five Brake Shoe foundries integrated by the move are located at Medina and Rochester, New York; at Mahwah, New Jersey; South San Francisco, Cal.; and Melrose Park, Ill. Before the change, Brake Shoe included among its components an Engineered Castings Division, but only two foundries were contained under that heading.

Announcement of the new, enlarged Engineered Castings Division follows by several weeks Brake Shoe's organization of a new Railroads Products Division, which integrated four Brake Shoe divisions serving the railroads. The new Engineered Castings Division comprises three foundries of the former Brake Shoe & Castings Division which were not incorporated into the Railroads Products Division. To those foundries were added the two foundries of the former Engineered Castings Division.

The administrative, technical and operating resources of both the former Brake Shoe & Castings Division and the Engineered Castings Division will be available to the new and enlarged form of the latter.

MMM TO DISTRIBUTE SPEED-D-BURR EQUIPMENT

Speed-D-Burr Corp., Glendale, Calif. manufacturers of precision barrel finishing equipment and supplies, has announced an agreement with Minnesota Mining & Manufacturing Co. to distribute Speed-D-Burr's equipment line through MMM distributors.

MMM distributors in Buffalo; Chicago; Chicopee, Mass.; Cincinnati; Detroit; Hazel Park, Mich.; Los Angeles; Minneapolis; Newark; Philadelphia; Providence; Roanoke; St. Louis; San Diego; Sanford, N.C.; and Stratford, Conn. will supplement Speed-D-Burr distributors in other areas.

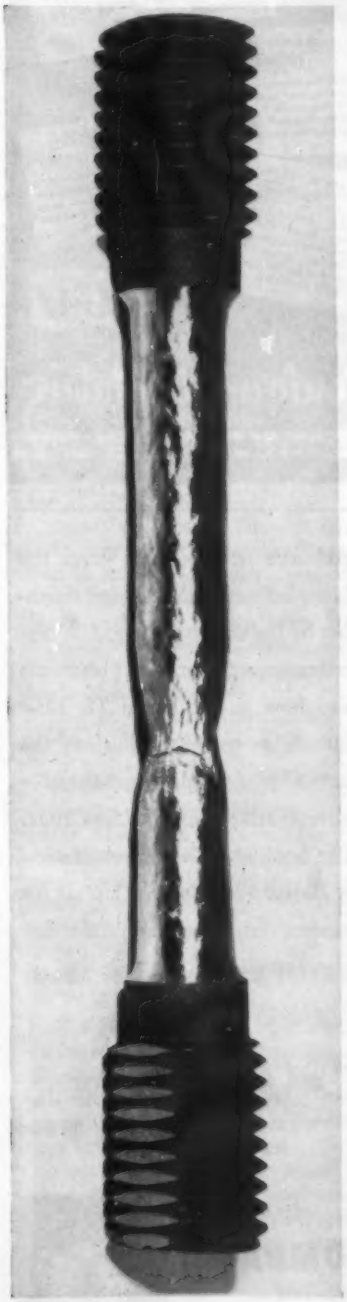
STAINLESS ALLOY

continued from page 63

above 150 Brinell. This comparison of properties is shown in Table III.

Table III

	CD-4MCu	18-8
Tensile Strength	140,000	77,000
Yield Strength	100,000	37,000
Brinell Hardness	300	150



1. Pulled tensile bar of CD-4MCu

The ductility of the new alloy is amply demonstrated by the pulled tensile specimen shown in Figure 1. The fracture is of the type always associated with metals and alloys of good ductility.

While some alloys will show good short time corrosion resistance, they exhibit an increasing rate of corrosion with time. CD-4MCu does not show any appreciable change of corrosion rate with time. This characteristic of the alloy makes it particularly suitable for such applications as valves, pumps, fittings, high-pressure components and similar parts where there must be an assurance of corrosion resistance over long periods of time.

Intergranular corrosion, another weakness of 18-8 type of alloys, seems to be completely absent when the corrosive media is one to which the new alloy is resistant. The Strauss test, generally accepted as a measure of intergranular corrosion, showed no change in the angle of bend before cracking occurred after the specimen had been exposed to boiling copper-sulfate, sulfuric acid solution for 72 hours.

Other corrosion resistance data at room temperature on the new alloy are:

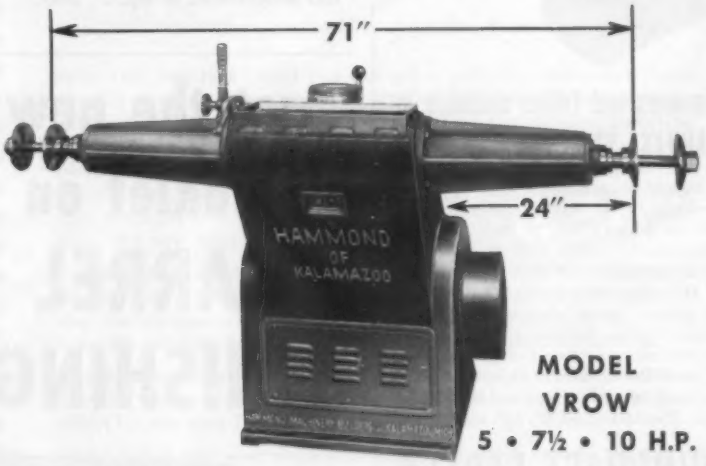
10% H_2SO_4	no attack
50% H_2SO_4	no attack
0.5% HCl	no attack
5% HCl	60 mils per year

These test results show that CD-

Hammond OF KALAMAZOO

WIDE—SWING

POLISHING AND BUFFING LATHE



MODEL
VROW
5 • 7½ • 10 H.P.

Ideal for bulky parts. Spindle overhang and extended bearing housings enable two operators to work without interfering with each other.

Hammond WIDE SWING Variable Speed and Single Speed Polishing Lathes are available with one or two *independent spindles.*

Other models available with a capacity up to 50 HP. *Write for catalog* showing America's most complete line of Polishing and Buffing Lathes.

Hammond Machinery Builders INC.

1642 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN

SEE US AT BOOTH 165, WESTERN METAL SHOW
Los Angeles, March 25 - 29

For more information circle No. 87 on the Reader Service Card

Circle No. 83 on Reader Service Card

NOW...

a Skimmer that really **SKIMS!** from **Spincraft**

SHELL WILL DO IT

Skimmers and Ladles available in STAINLESS STEEL and MILD STEEL

In answer to continued requests from hundreds of its ladle customers, Spincraft has added a line of truly superior skimmers. Designed after extensive research, Spincraft Skimmers meet die casters' skimming requirements. The shallow radius "skims" instead of "ladles" as deep-cupped skimmers do. Correct size perforations prevent clogging. Handle stub fits common pipe—attach a handle of exactly the type and length you want. Diameters: 6", 8", 10" and 12".

SPINCRAFT LADLES

for non-ferrous metal pouring

Light, tough, long-lasting — designed to reduce operator fatigue, minimize spillage and improve heat transfer. In 23 sizes, from ¼ lb. to 30 lbs.—with or without handles. A die-casting *must*.

Write for complete data and prices on ladles *and* skimmers TODAY.

Spincraft

SHELL WILL DO IT

INCORPORATED

4138 W. State St., Milwaukee, Wis.

Circle No. 73 on Reader Service Card

4MCu has better corrosion resistance than 18-8 in all of the media tested thus far.

The new alloy is reported to have good machinability, welding and grinding characteristics and good foundry characteristics, including fluidity and feeding.

NOZZLE TIP cast in CD-4MCu and age hardened to 321 Brinell. This part, cast by Empire Steel Castings, Inc. for The Allen-Sherman-Hoff Co., is for use with a water jet pump in the removal of power house ash. It will be tested in the pump for ability to withstand the corrosion and abrasive action of high pressure water. While this is a sand casting, the investment casting of parts in this alloy would be equally easy.

Cut Finishing Costs THROUGH INCREASED PRODUCTION

AUTOMATIC MACHINES

Increase production hundreds to one over hand methods. Reduce labor costs. Eliminate need of experienced workmen.

CLAMPS AND FIXTURES

Positive pressure and exact registration of the part in the mask. Reduce rejects. Free both hands for productive movements.

SPRAY PAINTING MASKS

A competent engineering staff will counsel with you on the most efficient technique for handling your particular requirements.

MASK WASHING MACHINES

50% faster than any other make. Cut solvent consumption. Avert production delays due to damaging of masks by hand scrubbing.

C/M

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Conforming Matrix CORPORATION

348 TOLEDO FACTORIES BUILDING — TOLEDO 2, OHIO

get the new booklet on BARREL FINISHING

Abbott's new booklet gives the latest information on barrel finishing by the Abbott Method. It describes equipment and materials and how to use them. *The abbot* introduces to barrel finishers the new Abbott Welded Steel Barrel—now available for the first time. The booklet, "*The Abbott Method of Barrel Finishing*," is a must for methods engineers and production men everywhere.

"Send for your copy today"

the abbot

THE ABBOTT BALL COMPANY

Producing carbon steel bearing balls since 1910

1084 New Britain Avenue, Hartford 10, Connecticut

ABBOTT

For more information circle No. 79 on Reader Service Card

SHELL PROCESS APPOINTS TWO DISTRICT REPRESENTATIVES

Two companies have been named as representatives to handle the Shell Process Inc., line of shell molding machines and allied equipment.

C. W. Lueders & Co. of Riverton, N. J. will represent Shell Process in Delaware, Maryland, New Jersey, and eastern Pennsylvania, and the Edwin A. Swensson Co. will cover western Ontario in Canada as well as the lower Michigan territory they presently have.

CANADIAN CENTER FINISHED

Metal and Thermit Corp. of New York has announced the completion of a combined office, warehouse, and manufacturing facility for Metal and Thermit-United Chromium of Canada, Ltd. The one and one-half story structure is located in Etobicoke Twp. in northwestern Toronto.

AMERICAN BRAKE MAKES SPECIALTY ALUMINUM CASTINGS

American Brake Shoe Company is entering the specialty aluminum castings business, according to an announcement from R. H. Schaefer, vice president and director of research. Limited production in a pilot foundry has been underway for about a year, and a new aluminum foundry is under construction at Mahwah, N. J.

Brake Shoe aluminum castings are now being used for structural parts and control assembles by aircraft manufacturers and will soon be available for general industrial applications.

CARBORUNDUM CO. PLANS NEW OHIO PLANT

The Carborundum Co. will build a new multi-million dollar plant in Van Wert, O. for the manufacture of high volume, small abrasive wheels, according to a recent announcement.

Approximately three years in the engineering and designing stage, the plant will encompass 91,000 square feet of floor space. The single-floor structure will measure 440 x 160 feet, with side extensions for offices and a battery of kilns.

now you can get this brilliant finish directly on zinc die castings!

No electroplating--no mechanical finishing!

NEW IRIDITE® (Cast-Zinc-Brite)

brightens zinc die castings by chemical polishing, protects against corrosion

NOW, FOR THE FIRST TIME you can get a brilliant, decorative finish directly on zinc die-cast parts . . . without mechanical finishing, without electroplating! The luster is provided by the *chemical polishing* action of new Iridite (Cast-Zinc-Brite) solution. Even surface blemishes, such as cold shuts, are brightened by this new process. No electrolysis. No special equipment. No specially trained personnel. Just a simple chemical dip for a few seconds and the job is done. And, this new Iridite has been *tested and proved* in production.

CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

AS A BASE FOR ELECTROPLATING—Lower mechanical finishing costs are possible where plated finishes are *required* since the brightness provided by this new Iridite may be sufficient.

LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for FREE PROCESSING for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. *IMPORTANT: when you give us samples for test processing, please be sure to identify the alloy used.*

Iridite is approved under government specifications

ALLIED RESEARCH PRODUCTS
INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD.

Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals; ARP Plating Chemicals

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For more information circle No. 78 on the Reader Service Card

Stepless temperature Control

NOW! TUBELESS, MULTI-LOAD

Improved Model JS Series **GARDSMAN** Stepless Controllers by WEST. One Instrument Handles a Range of Wattage Requirements.

★ Closest Control
★ Save power
★ Prolong Heater Life
★ Adjustable Band
★ Manual Reset
★ Simplest Operation—One Knob
★ Least Maintenance

Without tubes or relays, this unique instrument *modulates* input to suit demand. Proved in wide use. Write for Bulletin JS.

4357D W. Montrose Ave.
Chicago 41, Illinois

WEST *Instrument* **CORPORATION**
CHICAGO
SALES OFFICES IN PRINCIPAL CITIES

FEDERATED TO BUILD SECONDARY SMELTER

Construction is expected to begin early this year on a secondary aluminum smelter to be built by American Smelting and Refining Co.'s Federated Metals Div. When finished, it will double Federated's aluminum alloy production.

The plant, among the largest ever built to handle aluminum scrap metals, will have an annual capacity of 72,000,000 pounds of aluminum alloy ingot. It will be the most modern smelter of its type ever constructed, and will enable the division to cast every specification of aluminum alloy, according to Frederick Walker, ASARCO vice-president.

To handle the smelter's output, Federated will establish new sales and purchasing divisions at Alton. A special purchasing organization will acquire the large tonnages of scrap required.

APPOINTMENTS MADE TO ANDERSON RESEARCH STAFF

The addition of Thomas E. Leonard of Chicago and Russell S. Towers of Adrain, Mich. to the research staff of Anderson Chemical Co. of Weston, Mich. has been announced.

Pangborn Hydro-Finish cut cleaning time 50% in this plant

Paid for itself in only six months

Pangborn Hydro-Finish really paid off for this leading glass manufacturer. Cleaning quality increased moldlife 10% to 15% and total cleaning and polishing time was cut in half! The resultant savings paid for the machine in six months and represented a substantial weekly sum thereafter.

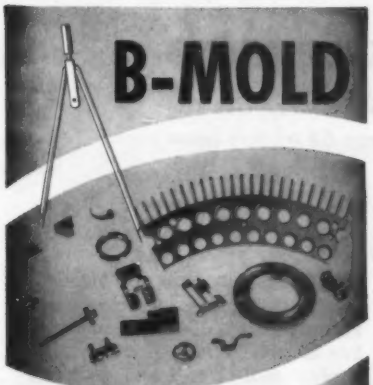
USE PANGBORN HYDRO-FINISH FOR:
Deburring • Surface finishing • Finishing threaded sections • Improving cutting tool life • Maintaining dies and molds • Removing grinding lines • Removing heat treat scale • Preparing surfaces

Today, through new design and use of air jet sluriators, Pangborn Hydro-Finish costs less originally, costs less to maintain and gives you easier handling and added efficiency. Write for Bulletin 1403 to PANGBORN CORP., 3500 Pangborn Blvd., Hagerstown, Md.

Pangborn
BLAST CLEANS CHEAPER

For more information circle No. 92 on the Reader Service Card

Circle No. 16 on Reader Service Card



PRECISION NON-FERROUS PERMANENT MOLD

CASTINGS

Aluminum Bronzes, Manganese Bronzes, Yellow Brasses, Beryllium Copper and Aluminum Alloys

Consult our Engineering Department, without obligation.

B-MOLD DIVISION

Buckeye Brass & Mfg. Co.

571 N. Main St. • Mansfield, O.

REPORTS ON HIGH TEMPERATURE MATERIALS

Two Armed Forces research reports on high temperature materials have been released for industry use through the U.S. Department of Commerce's Office of Technical Services.

"Cemented Borides," (PB 121346) summarizes experimentation during 1954 and 1955 with Barolite IV, a high temperature material comprising several compositions of a chromium boride and a Cr-Mo alloy.

"Iron Bonded Titanium Carbide" (PB 121323) describes techniques developed for hot pressing iron bonded titanium carbide into various shapes to determine its physical properties.

A. MILNE & CO. INCORPORATES

A Milne & Co. distributors of solid and hollow tool steels, has become A. Milne & Co., Inc. The incorporation took place on the company's 70th anniversary.

ASCO INCORPORATES

Asco Sintering Co. of Los Angeles has incorporated, and is now known as Asco Sintering Corp.

FORGING, COINING and MILLING Eliminated!

This EPCO INVESTMENT CASTING Proves the Point

PART: Paper Gripper for Printing Press

MATERIAL: Alloy Steel 4340

PROBLEM: To lower costs substantially below those of difficult and expensive forming methods yet retain the following features:

1. Sharp reverse knurling for more efficient gripper action.
2. Maintain uniform gripping action from part to part.
3. Eliminate milling and coining operations.

SOLUTION: An EPCO Investment Casting - - It produced a sharp gripping pad in true relationship to the center line of part.

CONCLUSION: When the shape of a part makes it difficult or expensive to perform special forming operations check an EPCO Investment Casting as a possible solution.

Send us drawings, samples and specification of parts for detailed process analysis and cost quotation without cost or obligation.

Representatives Wanted in Baltimore, Philadelphia, Detroit and Chicago areas.

ENGINEERED PRECISION CASTING CO.

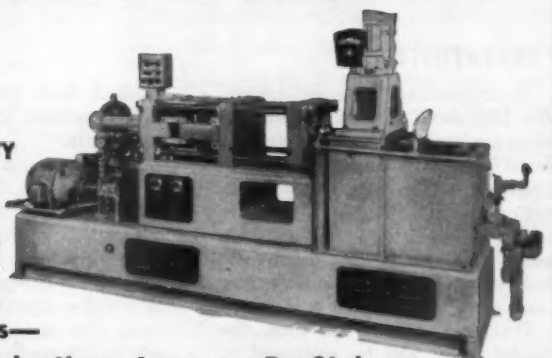
FREEHOLD RD.
MATAWAN, N. J.

MEMBER INVESTMENT CASTING INSTITUTE

HERE IT IS! A LOW COST — HIGH SPEED DIE CASTING MACHINE

UP TO FULL 3 lb. SHOT CAPACITY

Over 1300 Free Cycles Per Hour!



Reduce Costs—
Speed up Production—Increase Profits!

Now you can run high grade castings, up to 3 lbs., at high speeds and low operating costs. Actual tests operating 8 hours a day, 5 days a week, show total cost of gas and electricity of ONLY 17c PER HOUR!

Outstanding features include — all steel welded construction — automatic electric cycling at high speed — 17¾ x 17¾" die platens — 6½" die stroke — highest grade controls and valves mounted for easy maintenance and accessability — a complete package with self contained unit.

Available in Air or Hydraulically operated plunger gooseneck type for zinc, tin or lead, or, cold chamber type for aluminum, brass and magnesium.

Write for Free illustrated folder containing complete data on all models.

AMERICAN DIE CASTING MACHINERY CO.
1528 W. Thomas St., Chicago 22, Ill. PHONE: Armitage 6-3334

COMPONENTS
(Standard Equipment)
- VICKERS Hydraulic System
- NORTH AMERICAN Blower
- SQUARE-D Electrical Controls
- GREER Accumulator
- MARVEL Syncline Filters
- ROSS Heat Exchanger

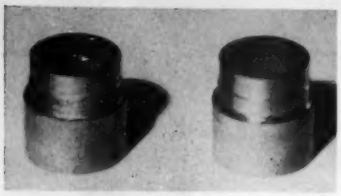
For more information circle No. 8 on Reader Service Card

Circle No. 36 on Reader Service Card

NEW PRODUCTS AND DEVELOPMENTS

Want complete details on these announcements? Use the Reader Service Cards. You'll find them facing page 64 of this issue

SINTERED IRON MATERIAL OFFERS GOOD MACHINABILITY

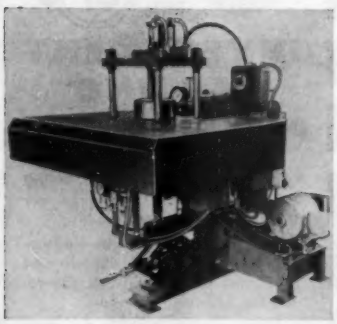


A free-machining iron material is claimed to be the first pure sintered iron material ever to combine excellent machining properties with low cost. Called "Powdiron FM," it is said to give a machined surface comparable to mild steel.

Cost of the material is kept low by not adding copper, as is usually necessary to get "decent" machinability from sintered iron. Manufacturers claim the material has especially high ductility and triples tool life over ordinary sintered iron, including iron-copper.

Bound Brook Oil-Less Bearing Co.
For more information, circle No. 205 on the Reader Service Card

DIE CLOSING PRESS FOR WAX PATTERNS



Semi-automatic production of wax patterns is now possible with a mechanical die-closing press designed for use on Sherwood wax injection presses, models WP-24 and WP-53.

Operating from the horizontal nozzle of the wax injection press, the press platens will handle dies to six inches high and 12 inches square. The press withstands injection pressures of 600 pounds per square inch up to 50 square inches of wax surface in the plane of the parting line of the die parallel to the platen.

It is fully automatic with adjustable sequence timed to regulate wax injection and dwell.

The lower platen of the die closing press is adjustable in distance below center of the wax injection nozzle from one and one half inches to four inches. A work table surrounds and is attached to the lower platen. Table height adjusts with platen height, and ranges from 31½ to 34 inches.

Alexander Saunders & Co.
For more information, circle No. 206 on the Reader Service Card

COMPACTING PRESS BUILT FOR VERSATILITY

A compacting press engineered for increased versatility through easy application of accessories has been designed with a welded steel D-frame which supports the die set on all sides. The frame applies its own rigidity to the working parts—the upper ram, floating die holder and ejection mechanism, each a unit assembly.

Pressure-rated at 30 tons, the model 30-W can be equipped in the field with utility-giving accessories such as an independent floating core rod support for the forming of blind or counter-bored holes.

Other accessories, packaged and fitting into place without machining of any kind, include a cushion cylinder to operate a secondary top punch, pre-pressuring die control, dual ejection mechanism and precision indicators for adjustments.

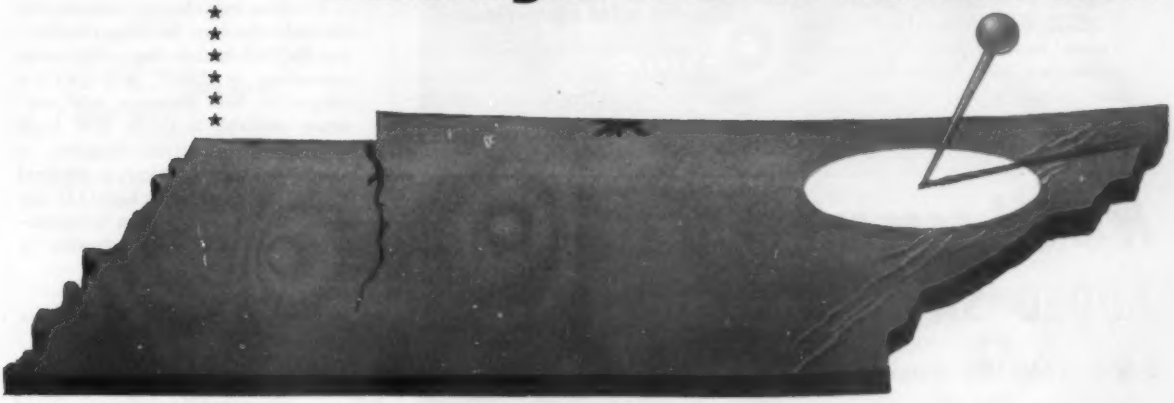
The press has a variable speed drive with a 10-40 stroke-per-minute range. Head stroke is six and three quarter inches, the same as the opening between the bottom of the top punch and the top of the die. Ejection capacity is 20 tons, and the ejection stroke is adjustable up to four and one half inches.

Guides provide precise alignment of the upper punch, die, lower punch and core rod. Bushings for these members are easily replaceable.

Baldwin-Lima-Hamilton Corp., Hamilton Div.
For more information, circle No. 207 on the Reader Service Card

Continued on page 94

We've discovered
PART OF AMERICA'S FUTURE
underground in Tennessee



As the American economy has expanded, the use of zinc by industry has greatly accelerated, until today's per capita consumption of zinc shows a giant 24% increase over the per capita consumption only seven years ago.

But what about the future? With zinc's importance to Industry's ever-increasing demands, what about the supply?

In recent months, American Zinc has discovered a part of America's industrial future... underground in Tennessee. In the East Tennessee area, mining properties which adjoin American Zinc's long-established Mascot, Tenn., mining operations, exploration and development have confirmed zinc ore reserves underground which are equivalent to *more than 75 years' production at the current rate* of mines now operating in this area.

Tomorrow's zinc for automobile grills and trim... the galvanized coatings for steel... zinc for die-castings and brass... zinc pigments for paints and rubber... now lies underground in American Zinc's Tennessee development.

American Zinc, lead & smelting company

Columbus, Ohio · Chicago · St. Louis · New York · Detroit · Pittsburgh

For more information circle No. 9 on the Reader Service Card

COOLING COMPOUND . . . does not stain

Grinding or machining of aluminum is now reportedly possible without staining or discoloration, with the use of a new straight oil compound.

Called International Compound #1231-A, the coolant quickly penetrates to the point of contact, preventing premature loading of dust on the wheel and the welding of chips or "bugs" to the cutting tool. Chips are drained off continually.

Completely free of fats, the compound is a special blend of mineral oils and synthetics that will not become rancid.

International Chemical Co.
For more information, circle No. 213 on the Reader Service Card

FURNACE LINE MADE . . . for pilot operations

A special line of furnaces especially designed for pilot plant operations requiring testing and determining proper methods and processes for heat treating and melting of metals has been announced.

Designed to fill the size gap between laboratory and production furnaces, this equipment enables manufacturers to set up a practical and controllable procedure for determining individual requirements for products and parts, according to designers.

The line includes six models: an atmosphere box furnace measuring 6x12x5 inches for continuous operation at 2600F, a 5½x7½x14¼-inch box furnace with reactor control, a three KW high frequency induction furnace, a horizontal tube furnace, a vertical tube furnace five inches O.D. by eight inches, and a high temperature pot furnace for operation to 2500F.

Lindberg Engineering Co.
For more information, circle No. 209 on the Reader Service Card

SINGLE-DIP BRIGHTENER . . . gives white color

A one-dip metal finishing powder has been designed to passivate and give a uniform bright appearance to cadmium plated work where brighteners are used in the bath.

Called "Kenvert No. 27," the powder gives a clear white metallic color without the yellowish hues usually associated with chromic acid bright dip on cadmium. Manufacturers report it gives excellent corrosion protection, resistance to staining and fingerprinting, and adhesion to clear laquer films.

Made to operate at 60-75F in either manual or automatic cycles, the powder needs no special ventilation of any kind, and is reported to be excellent for use in facilities which have limited tank space after plating.

Conversion Chemical Corp.
For more information, circle No. 210 on the Reader Service Card

SYNTHETIC WAX GIVES . . . shell mold lubrication

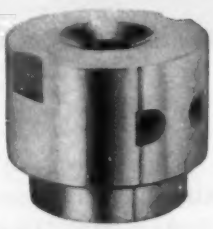
An ethylene bistearamide synthetic wax is reported to be an excellent lubricant for use in shell molds based on phenolic resin-sand mixes. The 140C melting point and good lubrication properties provide the following advantages where each sand particle is coated with the phenolic resin.

Mulling time and power for thorough coating of the sand is reduced when used at concentrations of 0.1-0.2 percent of the

NOW ESPECIALLY DESIGNED FOR ADDED SAVINGS TO DIE CASTERS!

D-M-E STANDARD Water-Cooled SPRUE BUSHING

- *Nitrided for Longer Wear*
- *Large Capacity Cooling Jacket*
- *Ground, Nitrided and Polished Seat*
- *Available From Stock*
- *Priced at $25.00 Each*



D-M-E STANDARD Water-Cooled SPRUE SPREADERS

- *Nitrided for Longer Wear*
- *Straight or Tapered Body*
- *Uniform Center Cooling for Fast Cycles*
- *High Quality Air-Hardening Steel*
- *Available From Stock*
- *Priced at $16.00 Each*

D-M-E STANDARD TAPERED CUTTER for Sprue Spreaders

- *Solid Carbide Cutting Edges — Rigid One-Piece Design*
- *Specially Designed for Standard Sprue Spreaders*
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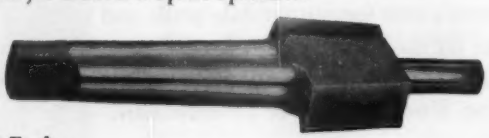

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Continued on page 105

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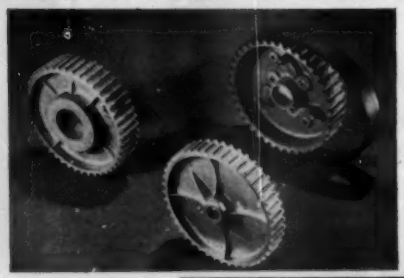

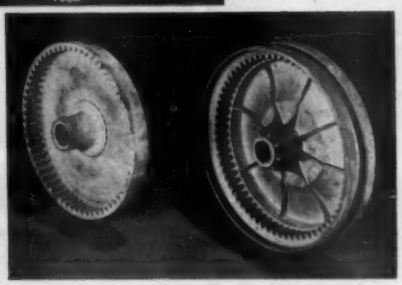

First of all, these new lightweight alloys which contain certain inherent qualities may help in avoiding design difficulties. Die cast gears, used extensively for low load operation, can satisfactorily replace machined or hobbed gears. For example: In addition to their savings in weight, aluminum offers corrosion resistance — magnesium offers sound damping. Both can be die cast accurately . . . offer fine appearance . . . help meet competitive situations by effecting cost savings through the virtual elimination of labor otherwise required for machining, finishing and assembling.

Following today's trend for effecting weight reductions in products, even though they are not necessarily of the "portable" type, many manufacturers find that through use of these alloys, shipping weights are favorably effected.

The photographs show: *Above*—Cog Belt Gears. *Below*—Internal Gears for Lawn Mower Wheels; the one at the left is of magnesium, the other aluminum. Note the peripheral groove for the tire which is integral to the die casting process.

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Fire-Resistant Hydraulic Fluids For The Die Casting Industry

Part 3: Phosphate Ester Base Types

by F. H. LANGENFELD,
Monsanto Chemical Company

THE basis of this paper is to evaluate both the phosphate ester type fire resistant hydraulic fluids and petroleum oil in terms of safety, reliability and economy.

Before making this evaluation, we should first mention the phosphate ester based fluids which are commercially available to industry today. Probably the oldest of such products is Tricresyl Phosphate.

This product has been used for years as a fire resistant hydraulic fluid in certain limited applications. The second series of products in terms of longevity are the Pydrauls and Skydrols manufactured by the Monsanto Chemical Company. The third group of phosphate ester fluids are the Cellulubes manufactured by the Celanese Corporation.

SAFETY

The main purpose of any fire resistant hydraulic fluid is to protect manufacturing plants and personnel from hydraulic fires. All of these fluids lessen or virtually eliminate the hazards of fire when they are used as the power transfer medium in any piece of machinery. The phosphate ester based fluids are inherently fire resistant by their very chemical nature. While they can be made to ignite under certain severe conditions, they are self-extinguishing once the ignition source is removed.

When the fire resistant hydraulic fluids were introduced to industry, special tests were developed to facilitate evaluating these fluids in terms of their fire resistance. Three of the most practical tests devised were the molten metal ignition test, the high pressure spray ignition test, and the hot manifold test. All three of these tests parallel conditions existing in a plant or factory where the hydraulic fluid could be exposed to ignition sources. When they were introduced to industry, these tests helped to prove that the phosphate ester based fire resistant hydraulic fluids were acceptable for industrial use.

At one time the measure of safety of a lubricant was based on the Cleveland open cup flash and fire test. This test was adapted by personnel within the petroleum industry and was intended as a method of identification of certain refinery distillates. Later it was accepted to some extent by this same industry as a means of selecting petroleum products for use based on their ignition hazard rating.

While flash and fire points may be obtained by this test method for the phosphate ester based fluids, they do not reflect the true ability of the fluid to resist ignition.

Flash or fire occurs when a phosphate ester has been thermally decomposed, and it is the decomposition product that is combustible and not the phosphate ester itself.

There are certain lubricants available on the market today that have flash and fire points higher than those of the phosphate ester based fluids and yet these fluids may not be considered fire resistant.

On the list of safety items is the subject of toxicity. If a fluid possesses all of the fine qualities a fluid should possess but lacks the quality of being completely safe to handle, it is conceivable that this fluid would be ruled out as a commercially acceptable item. The phosphate ester fluids may certainly be considered safe

. . . MORE ON FIRE-RESISTANT FLUIDS

This is the third of a series of basic articles on the different hydraulic fluids currently available for use in die casting machines and presses operating in or near hazardous areas. Subsequent articles will be:

April — Steps To Take When Installing Fire-Safe Hydraulic Fluids, by Charles R. Schmitt, E. F. Houghton & Co.

May — (Title to be announced), this final article will deal with the experience of a large die casting company.

to use and rank in the same order of toxicity as petroleum oil.

RELIABILITY

The word "reliability" is certainly self-explanatory. Everyone in the field of lubrication has come to regard petroleum oil as an old reliable friend and find it quite difficult to accept fire resistant hydraulic fluids as replacements. Manufacturers in the fire resistant fluid business recognize the fact that their products must equal or exceed petroleum products in performance if they expect to displace them where fire hazards exist.

Since the petroleum products have been with industry for years it is desirable to list the features that make oil reliable and then see how the phosphate ester based fluids compare with these long established standards. The qualities to be discussed are:

Viscosity
Lubricity
Non-Corrosiveness
Stability

Viscosity

The phosphate ester based fluids are available in a wide range of viscosities just as are petroleum oils.

In comparing viscosity characteristics of these fluids with petroleum products, it is found that these fluids will generally undergo a somewhat greater change of viscosity with temperature than will most petroleum oils. This characteristic of the fluid is generally accepted by industry as being inconsequential, as most equipment used today operates at fairly constant temperatures, thus keeping the fluid at the viscosity desired. In addition, the viscosity pressure characteristics of the phosphate esters are such that viscosities will increase more rapidly with pressures than for comparable grades of petroleum oils. These values are not too significant in the pressure ranges used by industry today, but could be significant in the design of new, very high pressure equipment.

Absolute viscosities of the phosphate esters are somewhat higher than the absolute viscosities of petroleum products with comparable kinematic viscosities. Since absolute viscosities are derived by multiplying the kinematic viscosity of the fluid by the specific gravity, and since the ester based fluids have appreciably higher specific gravities, there results a higher absolute viscosity.

These are factors of more significant importance to the equipment designers and manufacturers than to the people who are operating equipment with the fluids.

Lubricity

Generally speaking, the phosphate ester based fluids have lubricities which at least equal, if not excel, the lubricities of premium grade petroleum oils. Lubricity is extremely important in providing long and reliable life to the pumps and various other components which make up a basic hydraulic system.

There are two major characteristics that a lubricant should possess. It should, first of all, have sufficient oiliness to protect bearing surfaces from wear and it should have sufficient film strength to keep these bearing surfaces apart even under varying or impact load conditions, that is, wear and E. P. characteristics.

Three of the most widely accepted tests used to evaluate these characteristics in the laboratory are the Shell Four Ball Wear Test, the Timken Extreme Pressure Test, and the Almen Wear Test. Comparative test re-

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By F. S. Ross, Vice-President in charge of Engineering Centr-O-Cast and Engineering Co.

Up to a few years ago, the centrifugal casting process was employed primarily to manufacture such items as bronze bushings and cast iron soil pipe . . . items that were either machined in their entirety or destined for applications where finish and accuracy were not important. However, centrifugal casting techniques began to improve with the experience gained casting bronze for armaments and railroad equipment. More accurate castings became possible, and faster production machinery developed.

The inherent good qualities of centrifugal castings had long been recognized: denser structure, more homogeneous mass, higher yield. For high-quality, low-production parts, the process was ideal, and it was felt that this type of casting would eventually dominate in any application where consistent quality was a prerequisite. The only drawback had been high production cost. Now, as older, slower foundry methods were replaced by efficient techniques and equipment, that drawback was removed.

Over the years, through re-design and improvement of centrifugal machinery, we at Centr-O-Cast have mechanized the centrifugal process to the point where we are selling at a cost comparable to die casting, with all the excellent properties of a permanent mold casting. No longer is the centrifugal process a backward method; its close tolerances, coring of holes, and interchangeability are now widely accepted by engineers.

On one particular part which we recently produced, the dimensional accuracy of the centrifugal casting was such that the parts were interchangeable with die castings. The die costs in the centrifugal method were one-third those of the die casting, and the resulting product was superior.

We can now say that our product has the accuracy of a die casting combined with the good physicals of a permanent mold casting. Because aluminum is so well suited to centrifugal and permanent mold casting, we are able to produce light, low-cost, easily machined parts for appliances, or for the aircraft and automotive industries, where light weight is increasingly important.

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TABLE I

SHELL 4-BALL WEAR TEST

	Steel on steel		Steel on bronze	
	1 kg. load	40 kg. load	1 kg. load	40 kg. load
Phosphate Ester Fluids	0.14-0.16	0.52-0.70	0.30-0.46	1.03-1.08
Petroleum Oil	0.20	0.80	0.96	2.71

(Results given in scar diameter in mm.)

TIMKEN B.P. TEST

	OK Load (lbs)	Film Strength (PST)
Phosphate Ester Fluids	35-50	17,000-17,500
Petroleum Oil	Less than 5	Seized

ALMEN WEAR TEST

	Wear (mg. metal lost)
Phosphate Ester Fluids	1.5-2.0
Petroleum Oil	Seized in 1 min.

(Test conditions: 4,000 psi load, 600 rpm shaft speed, 20 min. run).

sults on all three of these tests are shown in Tables I. In all three tests the phosphate ester based fluid was superior to a comparable type petroleum oil.

Non-Corrosive

In a hydraulic system there are many metals used in the manufacture of the various components.

The fluid used in any hydraulic system should not, in itself, be corrosive nor should it promote corrosion from air or moisture. The phosphate ester based hydraulic fluids parallel petroleum oils in their inertness to metal and are considered to be non-corrosive. However, if the phosphate ester based fluids are operated for extended periods of time beyond their recommended thermal limits, there is the possibility that thermal decomposition will take place and the decomposition products could affect some of the metals in the system. This statement is equally true of oil under the same operating conditions.

One large plus factor in favor of phosphate fluids, both in terms of retention of an oil film for lubrication and retention of an oil film protection, is the fact

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that the ester based fluids are polar compounds and tend to adhere to a surface more readily than do petroleum products.

Stability

Thermal Stability and Oxidation Stability are quite closely tied together. It is very difficult to make any all-inclusive statement on the thermal stability of all phosphate ester based fluids as no two of them possess the same thermal characteristics. Some of them are extremely thermally stable while others show some weakness in this property. In every case, the fluid manufacturer knows the thermal characteristics of his own fluid and prescribes the temperature operating limits accordingly.

Other elastomeric items in the system that may require replacement are accumulator bladders or diaphragms and flexible hoses. In the case of the accumulator, the bladders or diaphragms should be changed or eliminated.

Flexible hoses are generally replaced on a conditional basis. If the equipment to be converted to phosphate ester based fluids operates at a relatively low pressure, there is usually no need to change the flexible hose already installed. If the equipment to be converted has a high pressure hydraulic system, the flexible hoses should be changed.

Paints

The phosphate ester based fluids have a tendency to soften or dissolve many of the industrial paints now in general use as well as acting as a detergent on gums and other deposits. When these fluids were first introduced, this plasticizing characteristic was of great concern since many equipment manufacturers painted the inside of their fluid reservoirs and hydraulic components. It was felt that this removed material could cause pump and valve malfunction.

Fortunately, field experience proved this plasticizing effect on paints was not harmful to hydraulic system performance. For the most part the phosphate esters plasticized the paints to the point where they were completely fluid and were readily pumpable. However, it is suggested that, after a piece of equipment has been converted to a phosphate ester type fluid, a by-pass filter be connected to the system to pick up any paint particles or other residue that may not have been completely dissolved or removed

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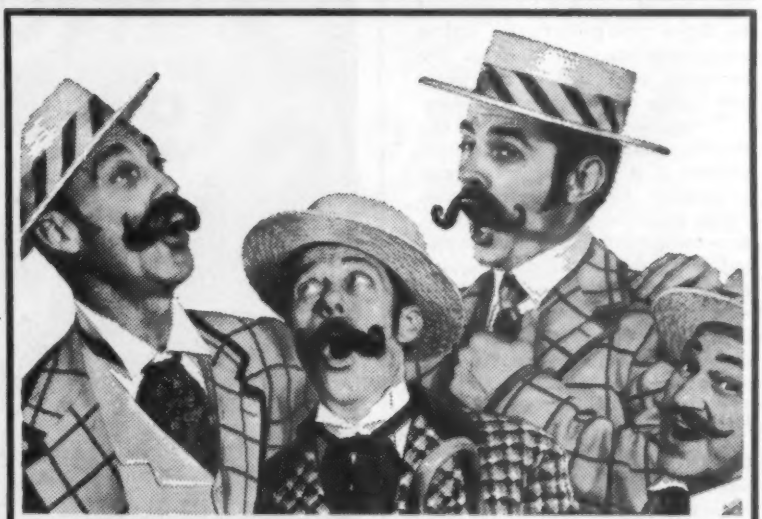

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by the regular system filter.

Once the paint and other deposit material has been removed from the interior surfaces of the equipment, it need not be replaced, as the phosphate ester based fluids in themselves are non-corrosive and provide the necessary protective coating for the surfaces.

Today, there are paints and primers available that can be used with this type of fluid if the operator feels it is necessary.

Pipe Thread Compounds

Just as the phosphate ester based fluids have a tendency to plasticize some industrial paints, they also tend to plasticize some pipe thread compounds.

This has never proved to be too much of a problem, but it should be called to the attention of manufacturers and fluid users so they can standardize on pipe dopes which are impervious to these fluids as well as petroleum products.

The fluids under discussion can normally be operated at continuous temperatures between 225°F. and 300°F. without fear of thermal decomposition. The fluids can withstand temperatures in excess of 300°F. for short periods of time, but should not be subjected to these temperatures unless equipment design dictates the necessity of it. All of the fluids are highly resistant to oxidation.

There are certain other desirable qualities a fluid should possess if it is to be considered acceptable for commercial use. These qualities are low volatility, non-compressibility, non-foaming, adaptable to existing equipment, and they should not be electrical conductors. The phosphate ester type fluids have proved themselves acceptable in every one of these qualities.

ECONOMY

Someone always asks the practical question, "Just what do I have to do and how much will it cost to put this fluid in my hydraulic system?" As in any case of mechanical or operational advancement, certain compromises have to be met to take advantage of an over-all gain. In order to enjoy the safety these fluids provide, certain shop practices and some types of existing equipment may have to be slightly modified to accommodate the product.

Fluid Costs

The phosphate ester based fluids range in cost from approximately $3.30 per gallon to as high

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as $15.00 per gallon. The variation is determined by the end use of the fluid based on chemical composition. While it is true that these initial costs are appreciably higher than the petroleum products they replace, there are many plus factors besides safety through fire resistance which make the use of these fluids quite attractive.

First of all, these fluids have exceptionally long service life if operated within the manufacturer's specification. This is best illustrated in terms of the aviation product, Skydrol. Skydrol has an approved service life of 4,000 hours when used in the cabin pressurization transmission of an air transport aircraft such as the Douglas DC-6. Comparable petroleum oils in this same application have an approved service life of only 250 hours. Even though Skydrol costs approximately $12.00 per gallon in comparison to $2.00 per gallon for the approved petroleum oils, the allowable service life of the fluid alone makes it more economical to use. In addition to having an excellent service life, the fluid itself is readily reclaimable.

All phosphate ester type fluids can usually be reclaimed by the equipment operator through a simple filtration process and may be used over and over again.

While the initial costs for these man-made fluids are higher in comparison to fluids made by nature, users are gaining the safety they are seeking plus the economies of having a fluid that provides a longer service life and is reclaimable for repeated use.

Seals — Packings — Hoses

The elastomeric seal and packing materials used in petroleum oil operated hydraulic systems today are not generally fully compatible with the phosphate ester based fluids. These seals tend to swell and soften in the fluid and may not offer the operational reliability they were designed to offer. However, seals and packings made of other polymeric materials, including elastomers, are readily available through established sources of supply and will provide the long service life to which industry is accustomed.

It should also be pointed out that it is necessary to change only the dynamic seals or packings when converting a piece of

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hydraulic machinery from petroleum oil to a phosphate ester based fluid. The static seals need not be changed unless the entire piece of equipment is to be disassembled at the time, thus providing a convenient opportunity to replace all seals and packings.

Many operators of hydraulic equipment have converted their units to phosphate ester based fluids without changing a single seal or packing. Today they are enjoying the same operational reliability as other operators who did change packings. It is felt, however, that such a practice should be considered the exception to the rule, rather than the rule.

Changing seals or packings may sound like a time consuming project, but, as a practical matter, experience has proved this to be a relatively simple operation. Since dynamic seals are the only ones that need be replaced, the number of replacement parts is at a minimum.

Since announcing this series of articles a paper "Straight Phosphate Ester Types," by W. D. Mathews, Celanese Corp. of America, has been received. This article will run in April.

HIGH TEMPERATURE CONFERENCE TO BE HELD

The third High-Temperature Materials Conference to be held in Cleveland, Ohio, April 16-17 will be sponsored by the AIME. Two previous conferences, one under the auspices of NACA and the other sponsored by AF-ASM were both closed meetings due to the classified nature of the material under discussion. This third meeting will not be classified and hence open to any one interested in materials for use at temperatures above 1500°F. Meetings will be held at the Hotel Carter in Cleveland.

Papers to be presented will take up the present status of development, basis of strength, problems and shortcomings, and the future of each class of materials. The effects of vacuum melting and testing environment on high-temperature properties will also be discussed.

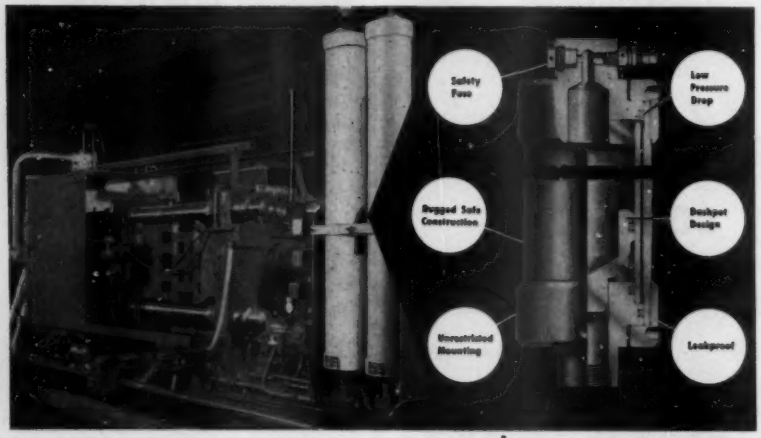
The program will cover:

"Cobalt-Base Alloys," by Glenn A. Fritzlen; "Nickel-Base Alloys," by F. L. Ver Snyder; "Chromiun and Its Alloys," by Howard R. Spendelow; "Moly, Its Alloys and Its Protection," by Julius Harwood; "Refractory Metals—Tengsten, Tantalum, Columbium, and Rhenium—Strength and Protection," by John W. Pugh; "Observation of Sintered Aluminum Powder and Present Theories for Its Strength," by Fritz Lenel; "Cermets and Bonded Hard Metals," by J. T. Norton; "Effect of Testing Environment on High-Testing Properties," by Donald Douglas; and "Effect of Vacuum Melting on Properties of High-Temperature Alloys," by Richard A. Flinn.

The dinner speaker will be Mr. Willy Ley who will talk on "The Conquest of Nearby Space." This talk will deal with project Vanguard and the speaker's opinion of what should and could follow after Vanguard.

This symposium should be of particular interest to all men who design for and produce investment castings due to the increased importance that this method of fabricating plays in the utilization of these new high-temperature, high-strength materials. Further information about the symposium can be secured from Dr. M. A. Steinberg, Horizons, Inc., Cleveland, Ohio.

Super-Hy Accumulators Help Cast Master Die Casting Machines operate more efficiently and economically



Superior Accumulators

- Control shock and pressure surges
- Compensate automatically for pressure and volume
- Insure longer machine life
- Reduce machine down-time and maintenance costs

To provide high injection speeds, fast cycling, and high steady pressures for the production of dense solid castings, two Superior Accumulators are used on the Model 20-Z Cast-Master Die Casting Machine. Installation of Superior Accumulators assure safe, dependable operation and permit the reduction in size and complexity of the machine. Use of the Superior piston type accumulators simplifies hydraulic system design and installation, provides a constant pressure, compensates for fluid leakage, eliminates shock and surges, and prevents nitrogen loss.

Each Superior Accumulator is pre-engineered to meet specific operating requirements. Check these features: Safety Fuse releases excessive gas pressure; Dashpot Design eliminates piston shock loads and hammering; Unlimited mounting facilitates easy installation; Floating Piston Type Separator; Low Pressure Drop; Large Selection to meet requirements up to 5,000 p.s.i., from 5 to 4,030 cu. in. net gas volume, from 3 to 3,465 cu. in. max. oil working volume.

Write for detailed literature and prices.

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Division of Superior Pipe Specialties Co. • 2917 S. Cicero Ave. • Cicero 50, Ill.

For more information circle No. 76 on the Reader Service Card

MEASURING SYSTEM CHECKS ... molten metal temperatures

A new measuring system offers a fast and inexpensive means of checking the temperatures of both ferrous and non-ferrous molten metals and alloys at temperatures up to 3200F. The system employs a specially designed light-weight immersion thermocouple with a portable electronic indicator or a permanently-mounted recorder.

Typical uses of the system include determining the exact "freezing" point of a new melt to establish proper pouring temperature, indicating when a melt in the furnace reaches the established pouring temperature, and checking temperatures of melts at various locations in the shop.

The thermocouple is connected by an extension wire—as long as required—to either a dial-faced indicator or strip chart recorder. Weighing 30 pounds, the indicator can be easily moved around the shop. The recorder, usually permanently mounted, includes a signal light and audible warning system to simplify the temperature measuring operation.

Leeds & Northrup Co.
For more information, circle No. 214 on the Reader Service Card

LAYOUT COMPASS ... equipped with vernier

A beam type layout compass and scriber, permitting compass work up to a 12-inch diameter with a 6-inch scale and a 24-inch diameter with a 12-inch scale, is equipped with a vernier for reading to 1/128 or .001 inch.

One leg of the compass is attached to the end of the scale, which acts as the beam. The other leg, built in one piece with a serrated finger knob, slides along the scale to provide the required radius.

Both legs are fitted with removable phonograph needles, used as points to produce a line or scratch as fine as hair. The low-cost points can be changed frequently.

Titan Tool & Supply Co.
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Continued on next page

NEW!

HIGH SPEED
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Here's the new A·B·C high speed, low cost die casting machine which eliminates costly production of small die castings on large die casting machines. Air operated, the machine produces small non-porous lead, tin and zinc alloy precision die castings up to 1½ lbs.

The A·B·C is economical to operate and easy to set up. Its lightning production speeds makes single cavity molds practical and profitable.

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- AIR REGULATOR
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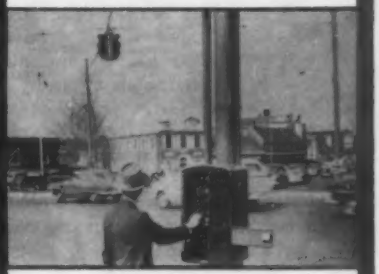
TCB = HB



Problem: What method can best be employed to cast our large Traffic Control Box . . . and who can satisfy our exacting requirements?

Solution: Aluminum Permanent Mold Casting . . . by Hampden Brass & Aluminum Co.

This was the solution Eastern Industries, Inc. found to their problem of housing the delicate "brain" of their radar traffic control system.

Pictured here is the end result . . . a non-corrosive, uniquely weather-proof, snug-fitting box, completely safe from tampering.

The permanent mold process was chosen by Hampden because it produces a fine, non-porous casting . . . the surface requiring no preparatory finishing before painting. The box was used as cast, thereby eliminating expensive profile machining for producing the rabbet fit of the box and doors. The high production rate and lower over-all cost of the permanent mold process prove additional advantages. Aluminum was selected for its lightweight and durable qualities.

Remember . . . whether your casting problems are big, tiny, intricate, or special . . . Hampden is ready to effectively solve them with premium quality castings of aluminum or other non-ferrous metals . . . utilizing the sand, permanent mold or die casting method. Our more than 50 years' know-how is your assurance of the best casting techniques to help reduce costs and improve performance.

Why not contact Hampden Brass & Aluminum Co. on your next casting problem . . . and avail yourself of our engineering counsel?

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PLATING PROCESS
. . . needs little brightener

A cadmium plating process has been developed which produces bright deposits with exceptionally low brightener consumption.

Called the Cadalume process, it is reported to increase brightness 10 percent, brightener life 400 percent, and speed plating up to 10 percent. For many applications, it is claimed that a bright dip is not needed.

The process is used to protect iron and steel parts from corrosion, and non-ferrous metals against surface tarnish, corrosion, or galvanic couples formed in assemblies.

Hanson-Van Winkle-Munning Co.
For more information, circle No. 215 on the Reader Service Card

IN-LINE TRANSFER TABLE
. . . without fixtures

An in-line transfer table without fixtures, which will transfer piece parts from station to station for automatic or manual operations, can be adapted to multiple, consecutive operations and will handle 6400 pieces per hour.

Designed for piece parts which have a flat surface on which to slide along a track from station to station, the table will cam lock parts at each station within .005 tolerance without auxiliary locating devices. For closer tolerances, a shot pin or locating plug can be used.

Base support contains an intermittent drive unit and may be located at either end or in the middle of the table to suit production requirements. Operators can work from both sides of the table, and machines or equipment are easily accessible from either side for adjustment or tool replacement.

Dixon Automatic Tool, Inc.
For more information, circle No. 221 on the Reader Service Card

DIE CASTING MACHINE
. . . built for fast work

With special emphasis on safe operating, simple, efficient design, and ease of maintenance, a new die casting machine with a 450-ton capacity has been built to give more production with less operator effort.

A simplified shot end design with an unusual adjustment device eliminates brute strength and large wrenches for cylinder adjustment. Only two nuts are needed for final clamping of nozzle to die.

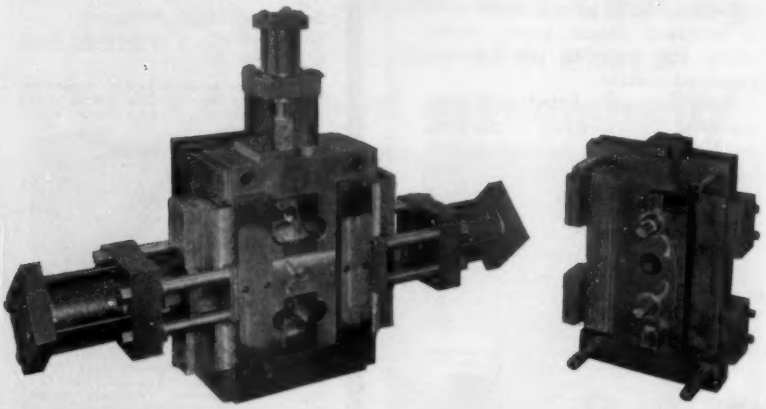
To facilitate maintenance, all four tie bars can be pulled without dismantling any part of the machine. Tank cleanout has been simplified, with easily accessible oil filters. Tank drainage is not necessary.

Unit Products Div., Unilay Corp.
For more information, circle No. 225 on the Reader Service Card

EXPANDING WHEEL
. . . has removable segments

A series of separate, replaceable rubber segments grip the coated abrasive and form the grinding surface of a new expanding-type grinding wheel.

Called Flexcore, among its advantages reported are: as segments become worn or damaged, they can be replaced singly or in groups at very low cost. The core never needs to be replaced; segments are available in a variety of hardnesses and can be used in any combination to attain different cutting actions.



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The design of a die and its accurate construction by well-trained die makers are the first requisites for good die castings. Our expert execution of this vital work is another reason why you should order "die castings from Pressure."

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ZINC AND ALUMINUM DIE CASTINGS
21500 St. Clair Avenue • Cleveland 19, Ohio

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Wheel diameters of three, four, five, and six-inch sizes are included, in widths to any specifications. Standard segments are full wheel width, but fractional segments are available for a "fingering" action for contour use.

Nu-Matic Grinders, Inc.
For more information, circle No. 218 on the Reader Service Card

FLUXING MATERIAL . . . is non-synthetic

A new fluxing compound known as Sodium Fluo Aluminate is now available to the smelting industry.

The material is not synthetic, but a natural product. Distributors claim it gives quicker, cleaner, and more economical fluxing operations.

Associated Metals & Minerals Corp.
For more information, circle No. 226 on the Reader Service Card

ROOTS-TYPE PUMPS . . . built in six sizes

A line of six Roots-type vacuum pumps cover maximum speed ranges from 92 to 4,900 cubic feet per minute.

Basic mechanism of these pumps is a pair of figure-eight-shaped rotors which counter-rotate in the pump chamber. These finely-machined pistons never touch each other nor the pump casing, eliminating the need for oil sealing which would contaminate the vacuum system with backstreaming vapors.

Motors operate within the vacuum, eliminating need for shaft seals, frequent sources of leakage. Roughing is done directly through the pump without the need of bypass or valving.

Consolidated Electrodynamics Corp.
For more information, circle No. 220 on the Reader Service Card

TAP DRIVERS OFFERED . . . in three styles

Tap drivers that feature an overrunning roller drive design that releases instantly and completely when preset torque is reached are now available in three additional styles.

The three new styles are: tension and compression type, quick-change type, and heavy-duty type. Tension and compression drivers compensate for variations in feed between spindle and tap, and release at preset torque rating when the hole is tapped. The tap floats in and out of the hole without overcutting or undercutting the flanks of the thread.

The quick-change type permits tool change without stopping the machine, speeding sequence operations involving drilling, reaming, and tapping. Heavy-duty type tap drivers featuring a rugged double roller design provide quick and easy adjustment in addition to constant torque setting.

Scully-Jones & Co.
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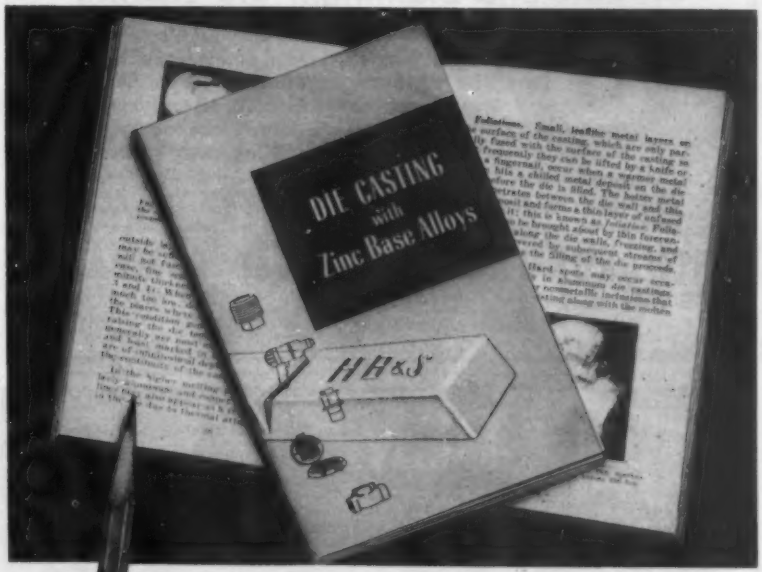
GET A COPY FOR EVERY MACHINE OPERATOR!



NEW HENNING

pocket guide to better casting

A wealth of helpful data made up in convenient reference form by HB&S as a free service to plant managers and die casting machine operators in industries using zinc base alloys.

Entitled "Die Casting with Zinc Alloys", this booklet is typical of the "extras" you get from Henning Bros. & Smith: spectrographic analysis of heats to assure purity; identifying number on hot bar pallets; heat number on every ingot; alloys that are specifically engineered and laboratory controlled to meet exact specifications.

So, if your design . . . your product calls for casting, turn to HB&S for service, extra service, "dependable service since 1922"!

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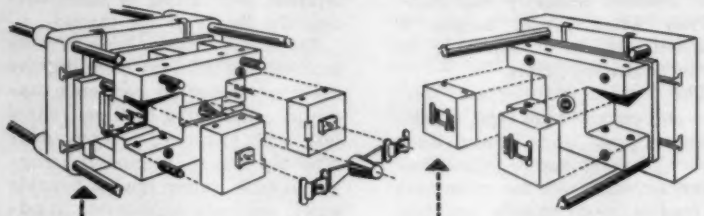
For more information circle No. 71 on the Reader Service Card



Master Mold puts an end to expensive handling of large die blocks.

Small cavity blocks can be changed in minutes and save storage space.

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on zinc and aluminum die casting

Master Mold can knock a big chunk off your die costs. It eliminates expensive die sets, leader pins, sprews, sprew cutters ***plus the expense of handling such heavy equipment.*** Master Mold cavity blocks need only minutes for changing. With them, you can run two jobs together — combining short and long runs, ***doubling your machine capacity.***

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OPPORTUNITIES

jobs & equipment

Opportunities rates: $20 for the first column-inch; $15 for each additional column-inch payable in advance. To answer box number advertisements, address responses to the box at Precision Metal Molding, 812 Huron Rd., Cleveland 15, Ohio. Closing date: 1st day of month preceding publication.

POSITIONS OPEN

MANUFACTURERS AGENTS WANTED —To handle well-established repeat supply item sold to pressure die casters. Leader in its field. Splendid earnings opportunity with a product that is a "household name" in the die casting industry. Give full details concerning lines handled. We are especially interested in frequency of contact you now have with pressure die casters. Write Box No. 3257.

REPRESENTATIVES WANTED — We are changing our sales policy and are interested in discussing the sales of our melting furnace equipment with representatives in various districts outside of New York and Chicago. We manufacture a complete line of gas and oil nonferrous melting furnaces in all sizes and types. Also interested in a salesman for our home office. Write Stroman Furnace & Engineering Company, 9900 Franklin Avenue, Franklin Park, Illinois.

WANTED — Sales representative — by progressive West Coast precision investment casting company producing ferrous and nonferrous castings. Several choice territories available for qualified sales personnel. Commission basis. Address all correspondence to Box No. 3357.

PROJECT ENGINEER—To take charge of process engineering in rapidly expanding investment casting company. Extensive background in gating and processing of investment cast ferrous parts. Additional background in shell molding will make man more desirable. Opportunity to participate in management of company. All replies confidential. Send resumes to E. H. Cooley, Precision Castparts Co., 5001 SE Johnson Creek Blvd., Portland 6, Oregon.

SALESMEN WANTED — Some experience — for aluminum die castings in the New York area, Pennsylvania area and New England. Write Box No. 3457.

POWDER METALLURGIST — 20 years experience in metal powders, finished parts, equipment, production, research and development — would consider sales. Write Box No. 3557.

EQUIPMENT

FOR SALE — Lester Phoenix Model 35 Type HHP2 die casting machine, cap. 6½ lbs. zinc, 100 ton, 18" x 20" die size, 9" opening. Cpl. with melting pot, hyd. pump, valves, controls. Aaron Machinery Co., Inc., 45 Crosby St., New York 10, N. Y. Walker 5-8300.

WANTED — Cleveland Die Casting Machine — 200 ton, zinc or aluminum. State age and price in first letter. Write Box No. 3157.

FOR SALE — Two Kux BA12 die casting machines. Still in operation. Will be available for sale in May. The Yale & Towne Mfg. Co., Salem, Virginia.

FOR LEASE — Up-to-date die casting plant completely equipped. New plant and new machinery ready to operate. Four (4) Reed Prentice No. 1½ machines all on ground floor, large parking area, plenty of room for expansion. When answering, state previous experience and how long in business. Write Box No. 3657.

FOR SALE — Kux die casting machine. Model BH 37-600 tons. Is convertible for aluminum and zinc. Used only 3 mos. Also have 2-400 lb. and 1 - 600 lb. aluminum furnaces. R. N. Freedman, Peerless Broil Quik, Northern Blvd. & Honeywell Ave., Long Island City, New York, ST 6-7954.

DESIGN ENGINEERING SHOW SCHEDULED IN MAY

The newest giant exposition in the industrial field, the Design Engineering Show, has been scheduled for the New York Coliseum May 20-23.

About 375 companies will occupy approximately 90,000 square feet of exhibit space, displaying the latest products in the original equipment market. Types of products to be shown include mechanical, electrical, hydraulic and pneumatic components, metallic and non-metallic materials, fasteners, finishes and coatings, shapes and forms, and accessories to product development.

Concurrently with the show, the machine design division of the American Society of Mechanical Engineers, will sponsor a conference on innovations in the design engineering field.

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for Research and Small Production

This Detroit PT Electric Furnace is ideal for all laboratory or pilot-plant metal melting. Cover holds converging indirect arc electrodes, swings aside for charging and pouring. Pot can be moved as a crucible or tilted on stand. Single power cabinet contains transformer and controls. Capacity 15 lbs. *Write for details.*

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- Die casting machines can operate up to 8-10 times longer before plunger rings need replacing.
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- Extended ring life up to 8-10 times greatly reduces ring cost, maintenance labor required for ring installation and increases machine productivity.

Precision Die Casting Plunger Rings have become so successful in cost reduction that our reputation has become world-wide for the finest in Die Casting Plunger Rings.

Write today for more complete information. When ordering, give complete specifications for your machines and your problems.

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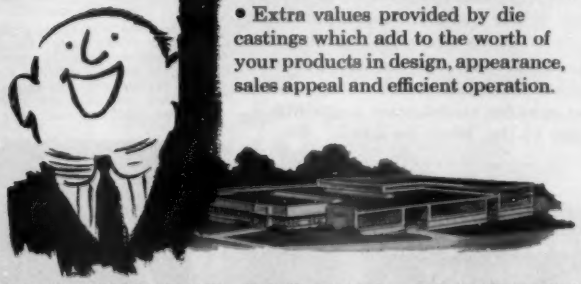
• Extra values provided by the modern Milwaukee plant with every facility for Complete Die Casting Service.

• Extra values provided by more than 45 years of continuous service to industry in producing precision die cast parts for all types of assemblies from small intricate instruments to heavy-duty equipment.

• Extra values provided by die castings which add to the worth of your products in design, appearance, sales appeal and efficient operation.



Milwaukee operates under the Certified Zinc Plan of the American Die Casting Institute.

MILWAUKEE DIE CASTING COMPANY
4146 N. HOLTON STREET • MILWAUKEE 12, WISCONSIN
Established 1909

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ELECTROCHEMICAL SOCIETY PUBLISHES "STRESS CORROSION" BOOK

Latest publication is the Electrochemical Society's series, "Stress Corrosion Cracking and Embrittlement," has been published by John Wiley & Sons. The book is edited by William D. Robertson, associate professor of metallurgy at the Hammond Metallurgical Laboratory of Yale Univ.

Based on a symposium arranged by the society's Corrosion Div. in Boston in Oct., 1954, the volume is devoted to major research developments of the past 12 years in both the experimental and theoretical aspects of structural metallurgy.

ASTE SILVER ANNIVERSARY MEETING SLATED MAR. 23-28

The American Society of Tool Engineers' silver anniversary technical meeting and convention will be held March 23-28 at the Shamrock Hilton Hotel in Houston, Tex. Scheduled are symposiums on ceramic and plastic tooling, technical papers and panels covering new advances, rolling techniques, machine tool selection, machining and grinding stresses, and oil industry tooling problems.

Six national honor awards for outstanding achievement in tool and manufacturing engineering will be presented. Four of the awards were inaugurated by the society in 1955, and two others, the ASTE Education Award and the ASTE Research Medal, are being given for the first time this year.

ADCI ADDS EIGHT TO MEMBERSHIP ROLLS

Eight companies have been accepted for membership in the American Die Casting Institute, bringing the total number of die casters enrolled in the institute to 118 companies operating 127 plants.

The new members are: Blue Ridge Pressure Castings, Inc., Leighton, Pa.; Conneaut Die Casting Co., Conneaut, O.; Detroit Die Casting Corp., Detroit, Mich.; Engineer Tool & Mfg. Co., Bridgeport Conn.; Harbot Die Casting Corp., Nutley, N. J.; Pioneer Diecasters, Inc., Los Angeles, Calif.; Stella Products Co., Livingston, N. J.; and Techni-Cast Corp., Hamilton, O.

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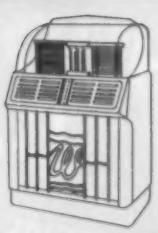
LIGHT, STRONG and LOW COST ACCURATE Magnesium Die Castings



...save up to 40% in weight and are lower in cost than heavier metal castings

ACCURATE'S magnesium die castings helped a leading manufacturer of coin operated phonographs to new production economies. Weight was reduced without sacrificing strength and at today's metal prices, castings were produced at a lower cost. Cast to close tolerances they require little or no machining . . . take a fine finish and cost less to handle all through production.

Accurate engineers will be happy to make unbiased-technically sound recommendations on the adapting of magnesium die casting to your products.

Here are 8 reasons why ACCURATE magnesium die castings are your best buy.

- Light Weight
- High Strength
- Low Cost
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- Close Tolerances
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- Laboratory Controlled Quality

Major Producer of Aluminum, Zinc and Magnesium Die Castings

ACCURATE DIE CASTING CO.
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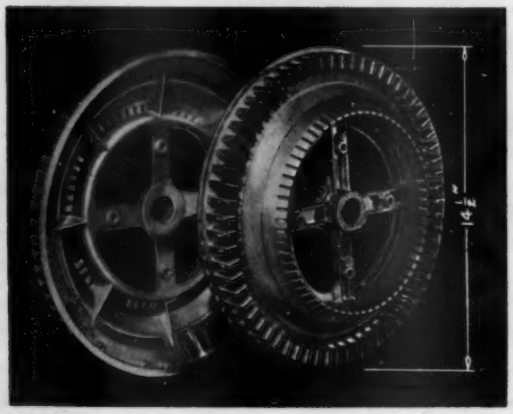

This juke box record magazine is a large and intricate part with its many projections and its 128 narrow slots accurately cast.

Another example of water hydraulic impact injection of aluminum die castings.

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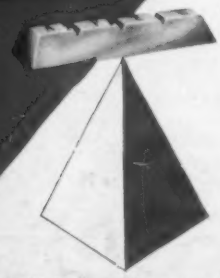

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